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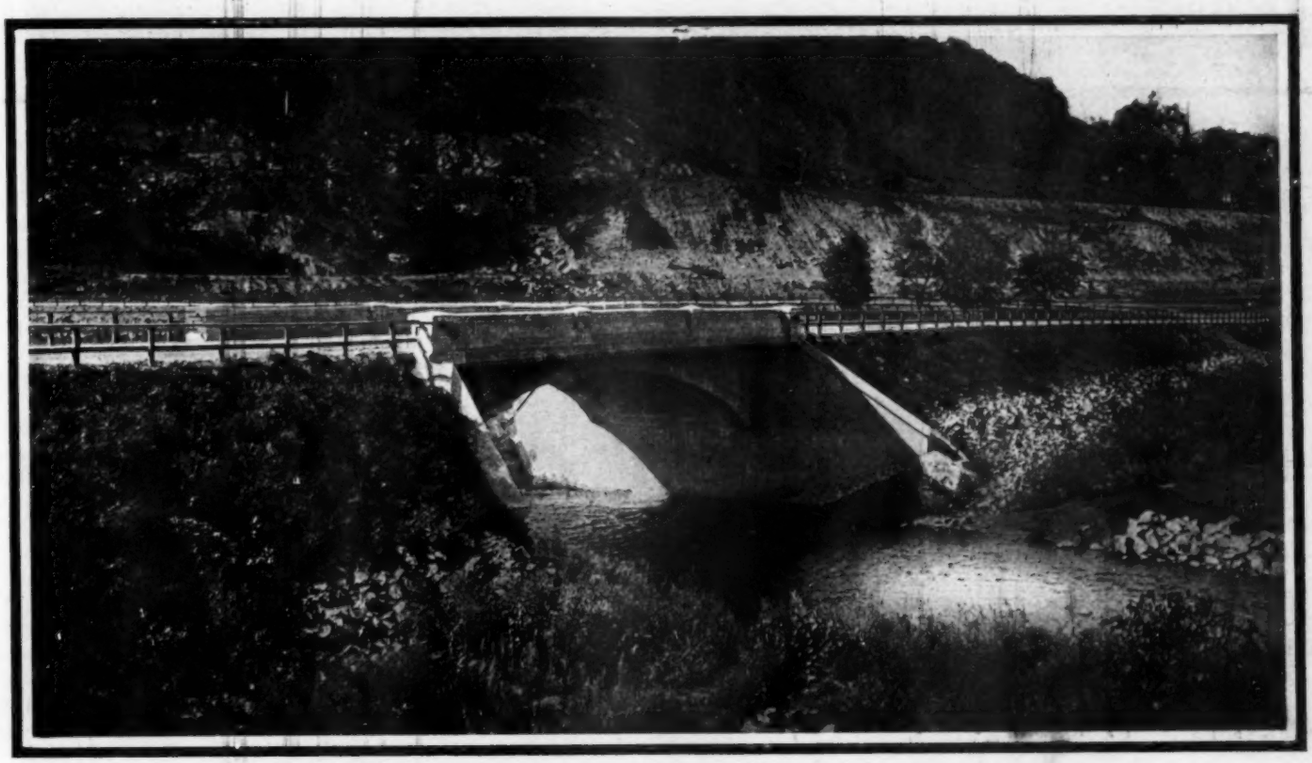
THE AUTOMOBILE

Good Roads, Keynote of Prosperity

Automobile Has Forced Issue of Improved Highways



THE LAST WORD IN BRIDGE CONSTRUCTION AS IT APPLIES TO MODERN GOOD ROADS

TRANSPORTATION measures the civilization of the world to-day, just as it has always done since the beginning of mankind. Each successive step upward that has been taken by mankind is founded upon speed and ease and the betterments of each in their relation with communication between more or less widely separated communities or individuals. The automobile is the highest form so far assumed by the idea of transportation, but in order to get the best results from the motor car goods roads are essential.

Next to the automobile itself the most important part of motoring is the road. In the broadest possible sense good roads mean prosperity and bad roads mean the reverse.

Of two communities equal in size and natural resources of surrounding territory, the one which has good roads will be found to be far in advance of the one where opposite conditions obtain, in every particular and factor that go to make up human well-being.

The automobile has forced the issue of good roads, as can be readily seen by one sweeping glance over conditions five years ago and as they are to-day.

At a banquet given in the New Kimball, Springfield, Mass., recently, during the inspection of New York and New England highways under the auspices of the Touring Club of America, Logan Waller Page, director of the Office of Public Roads, who acted as toastmaster, said that there were in the United States 2,155,000 miles of road and that $250,000,000 could be saved annually on the haulage of the three principal crops produced in the country if the roads were improved. On that basis the total

Two-thirds of this road is crowned so stiffly that horses are forced to the right. It is three years old

saving on the single item of agricultural haulage would amount to a staggering sum each year.

That is just one item of the advantages that would follow general road improvement. The others include practically everything that may be grouped as factors in human happiness, health and prosperity.

If the automobile never does anything more than center the attention of mankind on the roads, it has performed a mission that will surely have a high place in the history of civilization.

Five years ago a good country road was such a highway as could be traveled over in wet weather. Outside of a few boulevards and paved streets within the limits of certain cities there was no such thing as pleasure to be experienced in passing over the roads in any sort of a conveyance. To travel 10 miles in one hour behind a good horse would have been considered just cause for action by the authorities pledged to the protection of animals from cruelty, or from the point of view of a large part of the citizenship, just grounds for the appointment of a lunacy commission upon the driver.

This year practically $1,000,000 a day has been expended in building and maintaining highways, and in the future a still larger sum *per diem* will be devoted to this prime essential of civilization.

State Aid, a system by which the various state governments assist by supervision, direction and by actual money appropriations in the improvement of county and township roads, has been adopted pretty generally throughout the country. The most progressive of the States have gone into the work with earnestness and some of the most astonishing results have been attained.

The federal government is mightily impressed with the importance of good roads, and, according to the annual reports of the Office of Public Roads, hundreds of object lessons in construction and good practice have been given to scattered communities.

The result of these labors is to be felt in the awakened interest of the general public in the subject of good roads. From every quarter of the land appeals for more education in the matter of road building and maintenance are pouring in upon the Government.

For five years practically every section of the country has been trying to improve its highways. In the East, Massachusetts, New York, Connecticut and New Jersey have made notable progress, but everything that has been done so far may be regarded in a broad sense as experimental.

It was a pioneer movement in which fundamental principles had to be discovered and applied to conditions that were amazingly complex. Some of the earlier specimens of road building in the United States are still in existence, while others have long since disintegrated. The fact that two specimens were made of identical materials and by the same process and subjected to the same volume of traffic was no good reason for the expectation of an equal return of service. It was discovered that slight differences in grades, drainage and the angle of the crown caused one road to go to pieces and the other to "stand up." But, on top of this, it was also found that the road that was destroyed in a single season in one locality proved satisfactory in another.

As a result the highway engineers are still considerably confused as to the lessons conveyed by these experiments. What one may consider as an established principle of road building another will regard as still to be classed among the experiments. The reason for this confusion lies in the variance of conditions covered by the road builders.

The experts and engineers confess frank-

Splendid view of machine used in Massachusetts for spraying hot oil under pressure upon roads

ly that the ideal road has not been found so far in their investigations, and most of them will add "and it is not likely to be found." By this they mean that a standardized and uniform method of road building, suitable for all conditions and all traffic, cannot be discovered.

However, that admission is not nearly as important as it might seem at first glance. The time, money and energy expended in road work have not been wasted. An immense mileage of splendid, serviceable roads has been produced and is now in heavy service.

No man would appear at a formal social function, as a guest, clad in overalls. Neither would he work a pneumatic riveter high in the skeleton of a new skyscraper attired in the costume of the banquet hall. He would not promenade during a blizzard clothed in white duck, and he would not go to Coney Island on the Fourth of July in a bearskin overcoat.

There is a sense of the inflexible fitness of things that prevents the ordinary, sane human being from wearing clothing manifestly unfitted for the occasion, time and season. And thus it has been found with regard to roads.

But during the time that these experiments have been carried on the engineers have come by a vast mass of data having a distinct bearing upon the subject. They have been impressed with the necessity for good drainage, so that fine new roads may not wash out on the surface or break through into soft material which had been undermined by water.

In the widest sense good drainage is necessary for good roads. The use of tile pipes to carry off superfluous water has proved out excellently as far as subsurface work is concerned. Of course this is necessary in only limited degree, but where it has been given an adequate trial it has demonstrated its effectiveness.

Culvert building has been revolutionized since the automobile stimulated the good roads movement

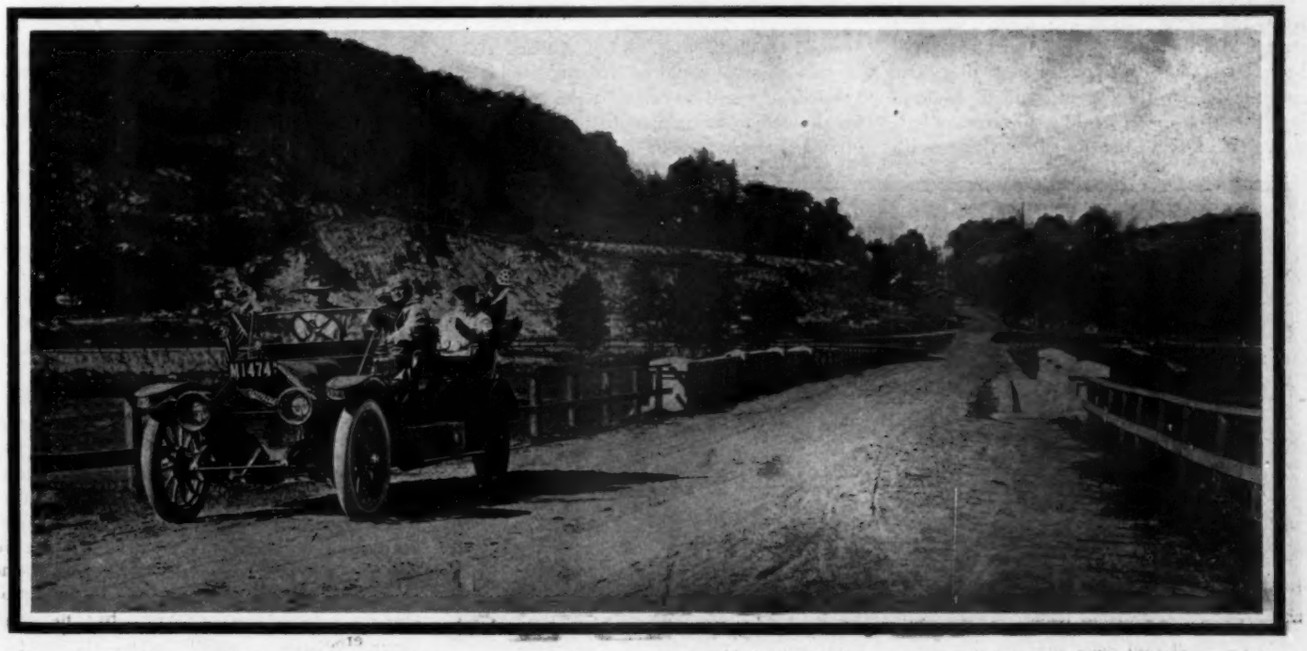
After a road has been surveyed, levels and grades established and such preliminary work as drainage has been performed, the next step, according to the conclusions of highway experts, is to lay the foundation. As a general thing, the foundation is spread upon a prepared bed; it may consist of coarse broken rock that has been screened to remove dust and minute divisions of the stone. Trap rock is a popular favorite, but in many cases where road-making material is at hand in quantity almost any other kind of rock is used. Unbroken gravel, screened to the proper size, is also a favorite material for surfacing the roads.

This foundation rock is spread to varying depths upon the prepared bed. These depths range from 4 to 9 inches and in some cases are even less. If the road is to be 12 feet wide the engineer directs that the lateral center of the road be raised slightly above the outside edges. This rise toward the center is called the crown of the road and serves the purpose of shedding water that falls or runs upon the surface.

It is usually from about one-quarter of an inch to the foot (or 1 1-4 inches at the crest of the crown) to 1 inch to the foot, which in a 12-foot road would produce a crown elevation of 6 inches.

The next step in construction may be the application of tar, heavy oil or some form of binder. This step need not necessarily be taken at this stage of the procedure, but present practice varies so widely that it may as well be referred to here.

The binder may be spread on cold or distributed over the surface under high pressure and at high temperature. Tar naturally requires some heat, but heavy oil may or may not be heated. The results, as far as the heat or its lack are concerned, appear to be about the same.



Fine example of New York highway crossing scientific culvert; note loose surface, which is practically dustless and easy on tires

Excellent example of modern practice in making retaining walls to protect road surfaces

A magnificent example of the application of hot oil under pressure was afforded the visiting road officials during their recent trip through Massachusetts. A complete road outfit was at work making a stretch of improved highway a short distance out of Springfield and the party watched the progress with intense interest. The device that spreads the oil consists of a tractor engine, equipped with roller wheels, so that the surface to be oiled is first subjected to the pressure of the wide rollers. The tractor draws the sprinkling device, which includes a trailer tank wagon and a pump driven by steam for forcing the hot bituminous liquid through a line of flare sprays, directed toward the roadway. The oil is heated to about 220 degrees and is expelled upon the road surface at a pressure of about 80 pounds to the square inch.

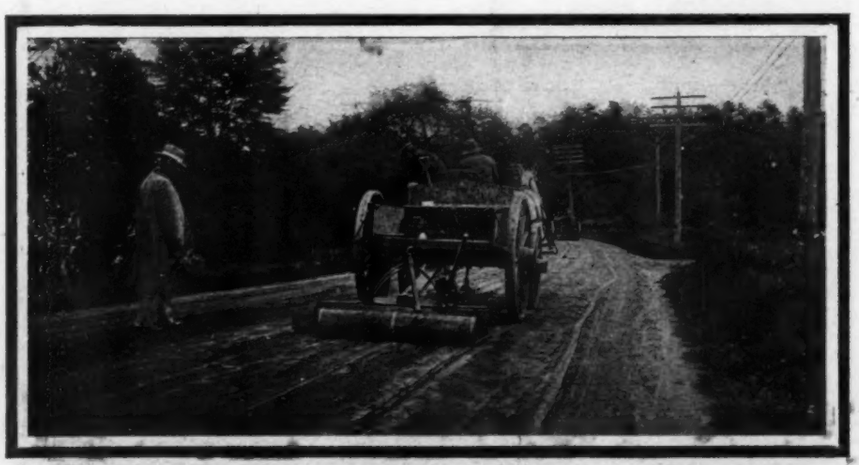
About 7 feet in width of road surface can be treated with oil in this manner. After the passage of the machine an examination of the broken rock shows that each individual piece has been covered on all sides with the black, steaming fluid. In this stretch of road the large broken rock had been covered with stone of smaller size and the binder then been applied. Following the passage of the oiling machine, shovelers swept the oiled surface with gravelly sand. Hand rakes were employed to remove large stones.

Rolling immediately after sanding a new road has proved to be of only mildly debatable utility. The road commissioners seemed to agree that, if the crushed stone of various sizes could be laid and the binder applied, it would be better if the road could be allowed to remain undisturbed until the oil had a chance to properly penetrate. This should be several days at the shortest period or several months if it be possible to keep the road closed that long. When the work is taken up again there should be another oil treatment and the final surface of the road, consisting of peastone or some other material rolled into it to form a monolith, securely bound by the asphaltic oil, or whatever binder is used. Finer material is then rolled into place and the road is complete.

In a general sort of way the procedure as above describes the chief processes of modern road building. Such a road subjected to a reasonable amount of both automobile and horse traffic ought to last many years if properly maintained. In fact, almost any kind of construction is good if repairs are made when needed. There are some roads in Massachusetts that have been down four years and are still in good condition; some of them conform on general lines with the practice outlined above.

It costs about $400 a year to maintain a mile of properly built country road at high efficiency. Thus the cost of maintaining 100,000 miles of excellent highway, such as some of the roads traversed by the inspection party, would be $40,000,000 a year.

The modern fence is a thing of beauty and utility, being visible at night and nearly indestructible



The small road roller and drag that are used in preparing roadbeds for their top dressing

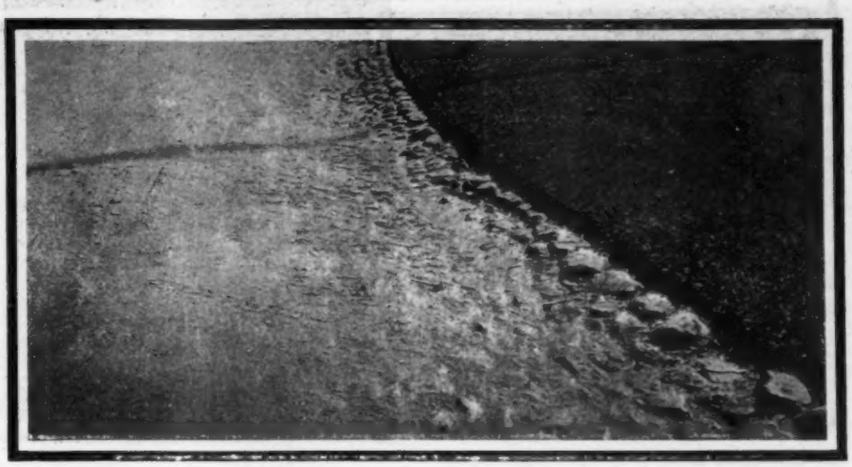
It has been estimated that 100,000 miles of perfect roads would save much more than their maintenance cost each year in actual money, thus leaving the enhancement in value of farm property; the improvement in living conditions in districts that are now considered to be isolated; and the sheer pleasure of using the roads for all purposes, as clear profit.

Among the associated problems that are intimately connected with road building are bridge and culvert construction, guttering and ditching, as well as the erection of fences to guard the right of way. Of the first of these incidents to road making nothing need be said at this time, as the engineering problems involved belong to another school. There has been a revolution in culvert construction within recent years. Where a small stream is to be

crossed and the span is not sufficient in size to require a real bridge the road engineers of to-day span the stream with a concrete culvert. This is securely founded and then built much the same as was its predecessor, the old stone culvert. The difference between the ancient and modern bridge of this description lies in the latter's strength, beauty and utility, which is about as much as can be said for anything that is made with human hands.

In any hilly country culverts are very frequently necessary and in Massachusetts there are literally hundreds of them included in the highway system. Some are as large as small bridges, while others are only large enough to allow the seepage of a stream a few inches in width.

Gutters are used largely where the prepared roadway extends the full width of the highway. Their use will probably be much more extended in the course of a few years, when the art of road making has progressed one step further. The best examples of guttering are found within the limits of some of the cities. Classed along with the stone gutters are the retaining walls, where cuts into the sides of hills have been necessary. They both serve the same purpose in different ways by protecting the road surface.



One type of curbed and guttered highway that is probably a good example of the road of the future

Old-style fences such as this one are out of place on the modern road and dangerous to traffic

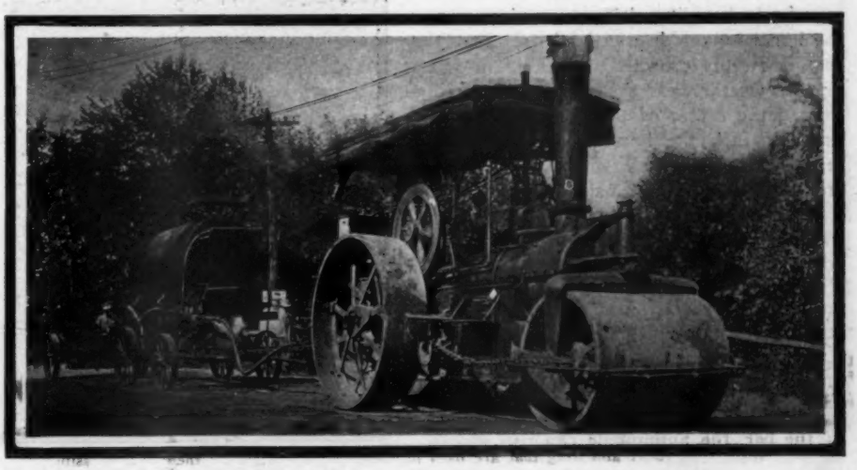
There has also been marked progress in the building of fences at dangerous points along the highways. The old style included nearly everything in the way of a fence from the proverbial snake and rider to dangerous barbed-wire; but the modern examples, such as may be found along any of the recently improved roads in New York and New England, are businesslike structures made with the rail in the form of a 6 x 6 beam, one angle of which is pointed upward and the opposite angle is set into sockets in the posts. These fences are whitewashed and the joints between the beams are covered in some sections with pieces of tin to protect the wood from the action of the weather. The reason for pointing one angle of the beams upward is twofold. In the first place such position has a tendency to prevent rotting by forcing the rain and melted snow to drain away and secondly no tramp has ever been able to solve the problem of sitting on the upturned edge.

The whitewash is an excellent idea as it helps the traveler to keep the road at night and warns him of possible dangers. These fences seem to shine out of the darkness and no cautious traveler ever need plunge into a ditch or off a culvert because of missing the road that is protected by them.

The chief lessons that have been learned in the past 5 years of experimentation and trial are these: The importance of maintenance; the significance of the angle in construction of the crown; the width and depth of road material, and the advantages that attend separation of the various classes of traffic.

It has been shown that nearly all of the methods of road building are good if the roads are maintained, and New York State has grasped the meaning of the lesson with a tremendous grip. There are some new highways in the State that are under the patrol system in more perfect form than it has assumed anywhere else in the country. This system consists in stationing a man in each 6-mile stretch of the highway under patrol. Material for mending the road is placed at intervals along its whole length and the man is furnished with a horse, tank-wagon and tools. It is his duty to keep his 6 miles of highway in perfect condition at all times.

As is shown in three of the illustrations, this process is perfectly practical. The man keeps on the road every working day in the year. When he finds a spot that gives signs of raveling he picks out the



Tractor roller, drawing hot oil tank and pressure oil-spraying machine

damaged surface and resurfaces the spot. This may require him to dig clear into the lower strata of the road surface and the replacement of all the smaller material that was bound in originally by the builders. Then he oils and surfaces the spot, using tamper and rolls, and when he leaves it the repaired place is hard to find.

It has been found that the patrolmen take a great pride in the character of their work and seek to excel others employed in the same line. If the cost of maintenance is placed at $400 a mile per year, and the material costs the State $150 a mile per year, the income of the patrolman from his 6 miles of highway would exceed that of the average skilled artisan.

The result of the system is delightful to the automobilist who is fortunate enough to travel over patrolled roads.

Next among the cardinal lessons that have been learned is that which has to do with the angle at which the crown of the road should be constructed.

According to Frank D. Kemp, of the Massachusetts State Highway Commission, the travel of automobiles alone does not wear out road surfaces with anything like the rapidity of destruction that follows horse travel, or, worst of all, the combined effects of horse and automobile travel. It has long been recognized that the horse cannot draw a load over a road that is steeply crowned, especially in wet or cold weather. If the proportionate rise toward the center of the highway exceeds one-half inch the horse has his troubles in using the road. He slips and flounders from side to side and makes a bad job of it when the surface is wet or frozen. With only a slight rise in the crown the horse does well enough.

On the other hand, the road crowned even as stiffy as is represented by 1 inch to the lateral foot will not stop the motor car. As long as the grades are not too heavy and the crown is not so high and pointed as to strike the underpinning of the car, the automobile can use such a road to advantage.

When the horseshoe calks penetrate the macadam, the end of the road is in sight

Mr. Kemp drew his conclusions from observing several stretches of State road under his personal supervision. One typical piece of highway was crowned in the proportion of about three-quarter inch to the foot. This road was 12 feet wide; consequently the crown in the center was 4 1-2 inches higher than the outer edges of the roadbed.

This proved to be too much for horse traffic and as a result the wagons proceeded along the side of the improved roadbed. This caused considerable raveling of that edge, but it left the high-crowned road to the exclusive use of the automobiles. At this particular point several important transverse roads lead into the main highway, and for a space of 6 miles this single road represents the only artery of travel to several populous local centers as well as the through travel. The road was improved 3 years ago and has not been touched since.

Of course, where the horses and wagons have broken down the edge of the macadam, the damaged surface extends well toward the center of the crown, but where the cars run the road is in excellent condition. This proves to Mr. Kemp that automobiles operated within the speed limit are not an important factor in wearing out the roads used only by themselves.

But it is a different story where the travel is mixed. So far in the progress of good country road building nobody has discovered a surface that will withstand heavy mixed traffic. Of course, granite block laid in concrete will support anything that has ever been devised in the way of traffic, but aside from the expense of such pavement its disadvantages are too appar-

Note the effect of horse traffic on this newly repaired surface

Where a calk wound has allowed water to penetrate, causing destruction of the road surface

One of New York's highway patrolmen working to keep his section in good condition

ent to dignify by consideration. The problem is country roads, and so far the mixed traffic of horses and automobiles has proved too strenuous for existing types, unless some such system of maintenance as the patrolmen of New York may be excepted.

There are literally thousands of examples of the truth of this in each of the New England States. Given a stretch of highway, constructed of approved material under approved methods, and if the crown is low enough to admit horse traffic along with the automobiles the life of that road is short. The effect of horse traffic is this: The calks with which horseshoes are equipped, to prevent the animal falling on slippery surfaces, dig into the new road surface. This is necessary from the horse's point of view, but exceedingly bad as far as the road and the automobilist are concerned. The effect of the calks is to loosen the surface, and when this process takes place in the fall it spells disaster to the road.

The rain and snow descend upon the road surface and after soaking into it come to a stop above the waterproof oil and tar except in such spots as have been pierced by the calks. There the water trickles through to the under layer of the road material and in the course of a considerable wet spell the lower strata adjacent to the calk wound are filled with water. Then when frost strikes hard and deep the damage is done. Water expands nine per cent. of its volume when converted into ice, and road material is not strong enough to withstand the fierce pressure of the swelling ice. There can be but one result, and that is for the surface of the road to bulge up, torn from its binder and separated into its integral parts.

When the Spring comes on and the roads dry the material pushed out by the frost is caught by the rapidly turning wheels of automobiles and soon decorates the surrounding country in the form of dust or is rolled into the ditch and carried away by the next rain. In its place is a hole that may cause a puncture or blow-out at any time and which gives the springs a twinge every time a vehicle passes over it. Let the process be repeated in the same place and it would surprise no road commissioner to find a hole there that penetrated to the roadbed.

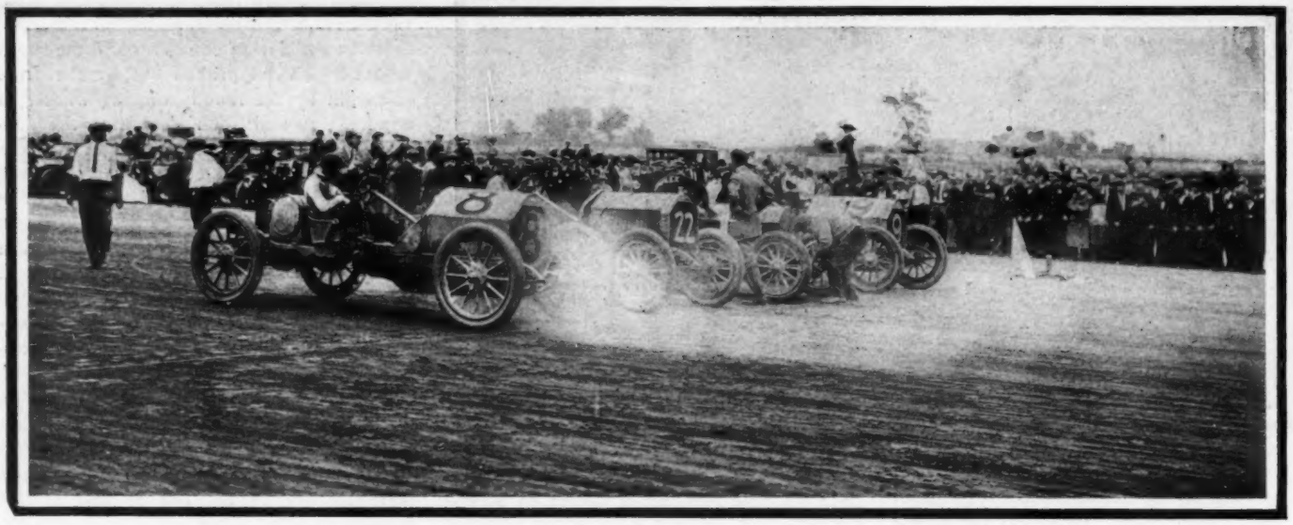
In a word the lesson learned from this phase of road building is that it is undesirable at the present stage of the art to allow automobiles and horses to use the same country roads. But as this is impossible to bring about under existing conditions, and as no road material will stand up under the mixed traffic unless carefully and constantly patrolled, the conclusion is either to install a patrol system or to build the roads wider, with the crown to one side of the center. If the crown were high enough this would be sufficient to bar horse traffic from that side of the road. Then the question of keeping the automobiles on the high crowned part would present quite a problem.

Material for resurfacing and barrels of oil are distributed along patrolled highways in New York

The patrolman is obliged to go through all the processes of road building and repair

The engineers believe that the most durable and satisfactory road of the immediate future will be one fully 9 inches deep and extending from one side of the right of way to the other. The road may be of almost any kind coming within the general classification "water-bound" and should be curbed and guttered. If some means could be devised to separate the automobiles from the horses, by crowning one side of the road higher than the other, or by making the apex of the crown approximately one-third of the distance from the right curb, or by putting in a low, stone curb, one-third the lateral distance from the left curb, the problem might be solved.

(*Continued on page 551.*)



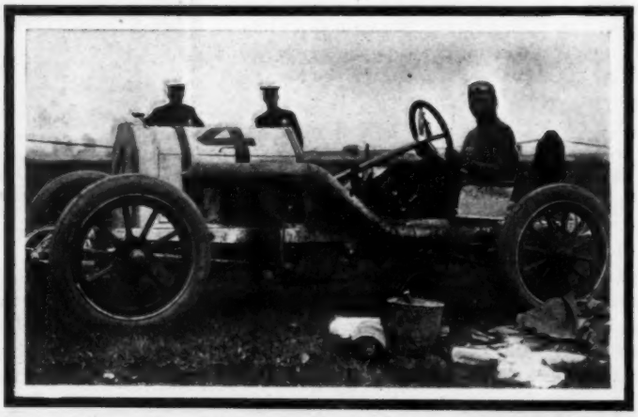
Start of the 25-mile race—Klinekar, Buick, Simplex, Klinekar—won by the Simplex, driven by De Palma

Simplex and Cino Win at Point Breeze

PHILADELPHIA, Sept. 25—De Palma, piloting a Simplex at the Point Breeze meet Saturday, smashed the mile track record of 58 4-5 seconds in the record trials, setting a new mark of 57 7-10 seconds; won the 10-mile open race, carded as Event No. 5, incidentally reducing the 5-mile track record of 5 minutes 45 seconds to 5 minutes 27 seconds, and setting a new mark of 10 minutes 42 seconds for the 10 miles; romped home a winner in the following event, a 5-mile free-for-all race, and finished up a good afternoon's work by winning the 25-mile special race with ease. In a special event, free-for-all handicap, however, he was forced to be content with third position, the winner of the contest having nearly a minute's start, almost a mile, a lead De Palma was unable to overcome.

Profiting by the unfortunate circumstances attending the race meet at Syracuse, N. Y., last Saturday, exceptional care was taken to avoid even a semblance of repetition of anything of the kind. The regular force of police that usually take care of the crowds was supplemented by extra forces on motorcycle, mounted and on foot, and spectators were roped off at a respectful distance from the track to prevent the more venturesome from letting their enthusiasm get the upper hand and straying too near the track for safety. As a consequence the races were void of the slightest mishap, without detracting in the slightest from the comfort and enjoyment of enthusiasts. The meet was the first one ever conducted by the Philadelphia Automobile Trade Association and the Contest Committee of that organization made a perfect job of it.

Only one event originally scheduled failed to come off—the ten-mile match race between Ralph De Palma, Simplex, and Louis Disbrow, Opel, due to the latter's machine being crippled while in transit to the track.



Cino, driven by Raimey, which won two races in impressive style

Line-up in the 10-mile race—Benz, Knox, Simplex—won by the Simplex

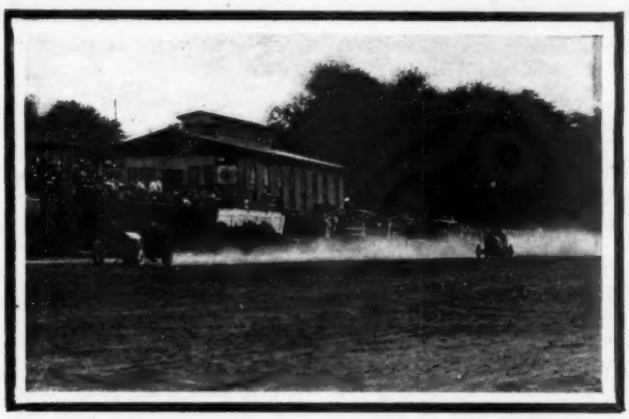
The record trials brought out three competitors—J. R. Raimey, Cino car, a newcomer to Philadelphia; Erwin Bergdoll, Benz, and Ralph De Palma, Simplex. The first two mentioned failed to cross the tape under the minute mark, and De Palma lowered the mark of 58 4-5 seconds established by Bob Burman in the Blitzen Benz recently.

Four cars competed in the second event, 5 miles. This race was notable for the fact that it marked the reappearance of Willie Haupt in racing. Haupt drove a Buick, but the car worked badly and he was forced to quit early. The race subsequently developed into a two-car affair, the E-M-F, Jack Tower driving, winning, with the Metz "Humming Bird" runner up. The next event was a repetition of the second insofar as the winner was concerned, the E-M-F again passing the judges' stand in the lead, the Klinekar, W. D. Morton driving, a good second, and the Abbott-Detroit third.

Only two cars finished in the fourth event, the Cino, J. R. Raimey driving, and Willie Haupt in a Buick. The former car started out in the lead and never relinquished it, although the Buick was always a dangerous factor and was in a good position to jump into the lead upon the slightest sign of a let-down on the part of the Cino. The latter won by about 100 yards.

Event No. 5, a special race with two starters, De Palma, Simplex, and Bergdoll, Benz, was provocative of daring racing and a great deal of excitement from the fact that the two machines were rarely more than 10 yards apart at any time during the 10 miles. A Knox car that had been entered in this event was ruled off on account of bad tires. It was during this race that De Palma set a new mark of 5.27 for 5 miles and 10:42.07 for 10 miles. Bergdoll also was well under the old record of 5.45 at the 5-mile mark, and although the crowd rooted hard for him to win, he finished a scant 3 seconds too late.

The Simplex also captured the following event, a free-for-all,



Simplex (De Palma) finishing ahead of Benz (Bergdoll) in 10-mile event

5 miles, with four starters, although it had its work cut out from the start.

In a free-for-all 10-mile handicap George Parker, a Philadelphian, driving an Ohio car, was returned a winner against four other contestants. Parker made good use of his allotted handicap of 55 seconds and after the fourth lap was never headed. The other cars in this event were Simplex, De Palma; Buick, Haupt; Klinekar, Seachrist; Cino, Raimey, and another Klinekar.

Two 25-mile races were an important feature of the afternoon, in one of which De Palma scored his third win of the day, the Cino being the winner in the other.

Start of $1000-and-under race—Hupmobile, Buick, Metz, E-M-F—won by latter

SUMMARIES OF THE POINT BREEZE RACES

Record Trials, 1 Mile

Pos.	Car.	Driver	Time
1	Simplex	De Palma	57.70
2	Cino	J. R. Raimey	1:03.76
3	Benz	Erwin Bergdoll	1:04.70

Class E, for Cars $1,000 and Under—5 Miles

1	E-M-F	Jack Tower	6:30.40
2	Metz	H. B. Baker	8:59.80

Hupmobile and Buick did not finish.

Class E, for Cars $1,500 and Under—5 Miles

1	E-M-F	Jack Tower	5:53
2	Klinekar	W. S. Morton	6:03
3	Abbott-Detroit	M. Roberts	6:06.40

Class E, for Cars $2,000 and Under—10 Miles

1	Cino	J. R. Raimey	11:35
2	Buick	Willie Haupt	11:59.41

Class E, Special Event, 451 to 600 Cubic Inches—10 Miles

1	Simplex	Ralph De Palma	10:42.07
2	Benz	Erwin Bergdoll	10:45.18

Class D, Free-for-All, Non-Stock Cars—5 Miles

1	Simplex	Ralph De Palma	5:24.18
2	Benz	Erwin Bergdoll	5:26.05
3	Cino	J. R. Raimey	5:28.45

Class E, Special Event, Free-for-All, Handicap—10 Miles

1	Ohio	George Parker	11:07
2	Buick	W. Haupt	11:52
3	Simplex	De Palma	11:53

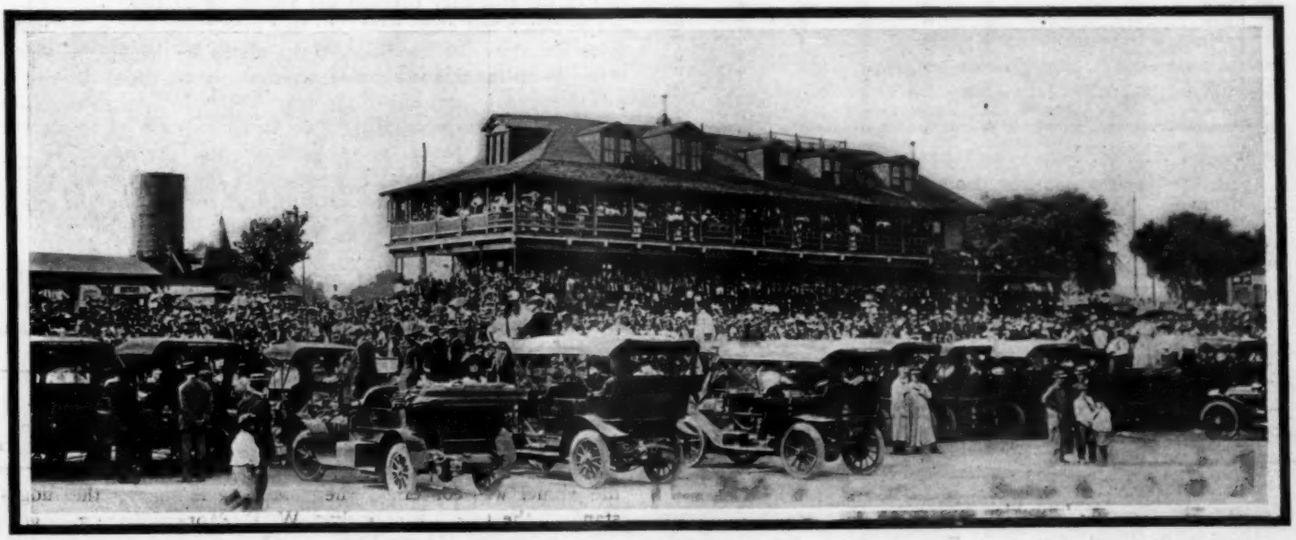
Handicaps: Ohio, 55 seconds; Buick, 1 minute 10 seconds; Simplex, scratch.

Class E, for Cars 161 to 300 Cubic Inches, Non-Stock—25 Miles

1	Cino	J. R. Raimey	28:25.18
2	Ohio	George Parker	28:28.91
3	Klinekar	E. Seachrist	30:11.95

Class C, Special Event, 25 Miles, 301 to 600 Cubic Inches

1	Simplex	De Palma	27:22.55
2	Klinekar	Morton	31:46.16
3	Buick	Haupt	32:52.25



Despite the mediocre programme Philadelphians poured into Point Breeze track by the thousands. Looking toward clubhouse from paddock

On the second day of the Chicago Truck Run the contestants stopped for several hours at the Stock Yards for demonstration purposes

The Big Saurer broke through a bridge on the third day of the test

20 Clean Scores in Chicago Truck Run

CHICAGO, Sept. 25—In a nutshell, the story of the three-day truck demonstration of the Chicago Motor Club is this: Thirty-two power wagons started; twenty-eight finished; four were penalized in the road test; four more went out under the technical examination; one was penalized in the brake test and two in the clutch test, leaving twenty of the contesting cars with perfect scores in every department.

So far as the road work was concerned, the test came to an end Wednesday night, when the run to Chicago Heights and return was finished. Then the trucks were garaged until yesterday, when the technical committee inspected them. The brake and clutch tests took place in the alley in the rear of the White garage. Paced by a pleasure car, the trucks were called upon to speed down the alley at the limit of their class pace. Each was given 50 feet in which to stop and every foot over that meant 1 point. Only one of the power wagons failed to do this, that being No. 3 Clark, which slipped 3 feet past the line while the hand brake was being used.

An interesting feature in connection with this test was furnished by the horse-drawn rig, No. 13, which made the trip to Chicago Heights and return in 2 days, while the motors made it in 1 day. It was decided by the technical committee that No. 13 should go through with all the formalities so far as possible and the two horses were driven into the alley and put to the brake test. Of course the driver could not use brakes, for in Chicago horse-drawn rigs do not have them, but the horses were called upon to show in what distance they could stop at a walk and again at a trot. Gravely they went through the stunt and in the walk they had the wagon at a standstill in 15 feet and in the trot they checked the vehicle in 28 feet.

The clutch test came next. In this each truck was called upon to demonstrate the condition of its clutch by facing an 8-inch curb. With the motor running at its maximum speed the clutch was dropped in and either the rear wheels had to spin or the motor kill to escape penalty. Two failed to come up to the requirements, one being No. 5 Sampson and the other No. 14 Adams, each being given 5 points. Of the three penalized in these two departments, two already had suffered on the road, the Adams and the Sampson, but the Clark lost its chances of a perfect score.

Following this the trucks were garaged and turned over to the technical committee for a final inspection. This was not anywhere near as rigid as in the case of the pleasure cars, the committee contenting itself by looking only at the essentials—the running gear, transmission mechanism and steering apparatus. No search was made for loose nuts or bolts or things of that sort which ordinarily bring penalties in pleasure car runs.

This examination robbed three of the cars of perfect scores. The greatest sufferer was No. 3 Clark, to whose score, already blackened by the 3 points in the brake test, were added 105 points—5 points for a broken spring leaf and 100 points for a

COMPLETE RESULTS OF THE CHICAGO TRUCK RUN

Division 2-K, 501-1000 Pounds

No.	Car.	Hand Brake	Emergency Brake	Clutch	Gear set	Road	Technical	Total
1	Mercury	0	0	0	0	0	0	0
2	Mercury	0	0	0	0	72	0	72

Division 3-K, 1001-1500 Pounds

4	Buick	0	0	0	0	0	0	0
6	McIntyre	0	0	0	0	0	0	0
7	Crown	0	0	0	0	0	0	0
5	Sampson	0	0	5	0	10	0	15
8	Krickworth	0	0	0	0	0	100	100
3	Clark	0	3	0	0	0	105	108

Division 4-K, 1501-2000 Pounds

9	Clark	0	0	0	0	0	0	0
10	Clark	0	0	0	0	0	0	0
11	LeMoon	0	0	0	0	0	0	0
12	Little Giant	0	0	0	0	0	0	0
16	Lauth-Juergens	0	0	0	0	0	0	0
20	Chase	0	0	0	0	0	0	0
17	Lauth-Juergens	0	0	0	0	0	10	10
14	Adams	0	0	5	0	6	0	11
18	Decatur	0	0	0	0	0	30	30
15	Swanson	Withdrawn						
19	Monitor	Withdrawn						

Division 5-K, 2001-3000 Pounds

21	McIntyre	Withdrawn

Division 6-K, 3001-4000 Pounds

22	Stegeman	0	0	0	0	0	0	0
23	Reliance	0	0	0	0	319	0	319

Division 7-K, 4001-5000 Pounds

24	Mais	0	0	0	0	0	0	0

Division 8-K, 5001-7000 Pounds

25	Alco	0	0	0	0	0	0	0
26	Old Reliable	0	0	0	0	0	0	0
27	Durable Dayton	0	0	0	0	0	0	0
28	Pope-Hartford	0	0	0	0	0	0	0

Division 9-K, 7001-10,000 Pounds

29	Saurer	0	0	0	0	0	0	0
30	Stegeman	0	0	0	0	0	0	0
31	Sampson	0	0	0	0	0	0	0
32	Alco	Withdrawn						

Division 10-K, 10,001-15,000 Pounds

33	Saurer	0	0	0	0	0	0	0

Not a few of the bridges had to be taken very gingerly by the heavier vehicles

The brake tests were held in a brick-paved street where the crowd was small and traction excellent

broken brake connection. No. 8 Krickworth was penalized 100 points—75 for a broken spring horn and 25 for a bent tie rod. The Krickworth had a good excuse, all the trouble being brought about by a skid into the ditch. Another perfect score went when No. 17 Lauth-Juergens was discovered to have two broken spring leaves, also caused by a ditch adventure. No. 18 Decatur was given 30 points for two broken spring shackles.

No. 1 Mercury won class 2K and its only opponent was another Mercury. No. 22 Stegeman won class 6K, in which the Reliance was the other contestant. No. 24 Mais had a walkover in class 7K, while No. 33 Sauer was alone in 10K.

Class 3K returns three cars as cup winners, No. 4 Buick, No. 6 McIntyre, and No. 7 Crown. In 4K No. 9 Clark, No. 10 Clark, No. 11 Le Moon, No. 12 Little Giant, No. 16 Lauth-Juergens and No. 20 Chase are tied with perfect scores. None finished in 5K, the McIntyre, the only starter, having quit the second day when it damaged its steering gear in a collision with a beer wagon. Class 8K, for the 2 1-2 and 3 1-2 ton trucks, was remarkable in that all four of the cars had perfect scores.

In Class 9K, in which four 5-ton trucks started, three went through with perfect scores, those being No. 29 Saurer, No. 30 Stegeman and No. 31 Sampson; No. 32 Alco, the other starter, was eliminated the second day by a burned-out bearing. No. 33 Sauer had a walkover in the big class.

The last day of the test, Wednesday, resulted in the elimination of only one perfect score, that being No. 5 Sampson, which was penalized 10 points for replacing a bolt in the torsion rod.

The routes included Whiting and Hammond, Ind.; Evanston, Oak Park and Chicago Heights, Ill.; but were largely within the limits of Chicago.

Lessons Drawn from the Run

The experience gained in the traffic zone within the loop appealed to the makers of 1-ton trucks more than to builders of 2-ton, 3-ton, 5-ton or 6.5-ton trucks, because the big trucks can make as rapid headway through traffic as the 1,000-pound delivery wagon.

The big trucks ran on a slow schedule of 5 or 6 miles per hour; this is the average speed through zones of congestion; but the smaller vehicles, running on a schedule of 11 miles per hour, found it impossible to average this speed in the traffic zones. They were held back at every corner by the policemen who allow the traffic to go one way at each crossing for a period of 1 minute and then let it go in the opposite direction.

Before the experience of one day in traffic, many of the makers of smaller trucks were guaranteeing as high as 15 miles per hour anywhere in the city for their trucks; but after 1 day of official demonstration they were willing to cut the guarantee to 10 miles per hour. One maker said that he would not guarantee over 10 miles per hour on his vehicles for congestion zones. It may be noted that when these little trucks got into semi-traffic-congestion areas, they were able to make an average of 15 miles per hour with ease.

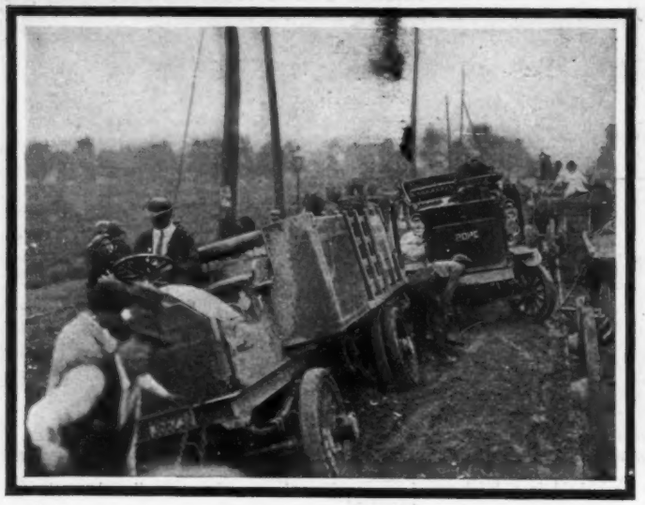
This speed experience is one of the most valuable of the demonstration. Speed has been going against the commercial vehicle for months. The inexperienced salesman will guarantee any speed to 25 or 30 miles per hour and in addition would guarantee the truck for life. Such would-be guarantees are absurd;

RESULTS OF BRAKE TESTS

No.	Car	Foot	Hand
1	Mercury	18	25
2	Mercury	32	23
3	Clark	28	53
4	Buick	20	27
5	Sampson	24	35
6	McIntyre	41	32
7	Crown	29	49
8	Krickworth	27	31
9	Clark	28	20
10	Clark	43	30
11	LeMoon	24	25
12	Little Giant	45	50
14	Adams	35	40
16	Lauth-Juergens	25	34
17	Lauth-Juergens	24	27
18	Decatur	18	36
20	Chase	26	25
22	Stegeman	11	15
23	Reliance	10	23
24	Mais	4	13
25	Alco	7	10
26	Old Reliable	7	13
27	Durable Dayton	10	13
28	Pope-Hartford	11	16
29	Saurer	9	13
30	Stegeman	11	11
31	Sampson	8	20
33	Saurer	4	3
13	Horse	Walk	Trot
		15	28

WEIGHT IN POUNDS

		Empty			Loaded			Total
No.	Car	Front	Rear	Total	Front	Rear	Total	Carried
1	Mercury	955	955	1810	1040	1830	2850	1040
2	Mercury	875	975	1840	1000	1845	2890	1050
3	Clark	1350	1875	3175	1500	3310	4770	1595
4	Buick	1400	1325	2680	1830	2600	4460	1780
5	Sampson	1515	1385	2860	1770	2630	4365	1505
6	McIntyre	1475	1475	2830	1675	2530	4225	1395
7	Crown	1365	1425	2680	1610	2635	4335	1655
8	Krickworth	1635	1135	2710	1890	2490	4425	1717
9	Clark	1635	1800	3400	2000	3540	5500	2100
10	Clark	1700	1900	3520	2310	3460	5640	2120
11	LeMoon	1575	1850	3400	1750	3770	5480	2080
12	Little Giart	1350	1500	2780	1780	3020	4860	2080
14	Adams	1925	1925	3785	2025	3770	5860	2075
16	Lauth-Juergens	1875	1515	3330	2195	3205	5430	2100
17	Lauth-Juergens	1995	1600	3500	2210	3460	5620	2120
18	Decatur	2055	1950	3940	2295	3740	5990	2050
20	Chase	1250	1425	2630	1670	3210	4700	2070
22	Stegeman	2350	2825	5050	2560	6760	9320	4270
23	Reliance	3500	2525	5830	4530	5534	9975	4145
24	Mais	3030	3720	6720	2970	8950	11835	5115
25	Alco	4550	4430	8745	6575	9470	15900	7155
26	Old Reliable	3510	4680	7975	4460	10770	15165	7190
27	Durable Dayton	3925	3550	7450	5365	8170	13510	6060
28	Pope-Hartford	3450	4040	7330	4330	9390	13440	6110
29	Saurer	2670	4250	6790	3600	12500	15930	9140
30	Stegeman	3250	5200	8215	3540	13000	16340	8125
31	Sampson	4500	6355	10800	6375	14815	20900	10100
33	Saurer	2850	5640	8380	4100	17455	21525	13145



Contestants held up trying to get around a gang of street repairers

they injure the business; they spoil sales instead of making sales; and they will eventually put the dealers out of business.

The one trouble which evidenced itself during the demonstration was that of hard tires. The solid rubber tire is imperative for heavy trucks, say from 3 tons up, and the trouble with it is in its coming off. When a solid rubber tire comes off, the wheel has to go to the tire repair shop before a new tire can be attached. The driver cannot put on a new tire on the road the same as with a pleasure car. Should a 5-ton truck lose a tire when 5 or 6 miles from the point of delivery, it would be necessary to get another wheel to the truck. This means that the truck owner should carry extra wheels, shod with tires, in stock. To get the wheel out to the truck takes time and time means money. From this demonstration it would seem that the demountable solid rubber tire is the only solution of the problem. It should be easier to supply a satisfactory demountable rim for a truck than for a touring car, because a solid tire is used. Some of the makers have such tires and rims but more of them are needed. On a 5-ton truck fitted with dual solid rear tires, the wheel with its two tires will weigh anywhere from 700 to 840 pounds. To carry an extra wheel around on the truck means quite an extra load in itself. To carry a single rubber tire with its rim would not be much over one-quarter of such a load. For trucks in which the motor is carried under a hood, the same as in a touring car, a single front tire of the same size as one of the dual rears could be used, so that one extra tire, carried on the truck, would be enough for all exigencies. On the other hand where the motor is carried under the seat, the seat being up in front, a heavier front tire is needed and this would make it necessary to carry two sizes of spare tires, which would be much preferable to carrying two extra wheels.

Reliance truck plugging through mud one mile out of Chicago Heights

The truck must operate on schedule. If it does not, it loses money for the owner. It delays the shipment of merchandise to out-of-town places; it may cause cancellation of orders; it may do a dozen other things, solely because it loses a tire and has to be hung up on the street until a new wheel arrives.

From the table of truck weights, printed on another page of this issue it is apparent that some of the trucks are very heavy for the useful load they carry.

Examination shows that for loads of 1-ton and under, the truck weight approximates one-third more than the load it carries. In some of these, the truck weight is almost double that of the load capacity of the machine. In the 2-ton and 2.5-ton trucks, the truck weighs about 25 per cent more than the load it can carry. In the 3-ton and 3-5-ton classes the truck weight is not more than 14 per cent. in excess of the load carried. As the truck capacity increases the weight of the load and the weight of the truck approach one another, thus the Sampson No. 31 weighs 10,800 pounds and carries a load of 10,100, or 700 pounds less than its own weight. The two Saurer trucks were the only examples of the truck being much lighter than the load carried, thus the 4.5-ton truck, No. 29 weighed 6,790 and carried a useful load of 9,140, or more than 40 per cent. in excess of its own weight. Again in the 6.5-ton vehicle, No. 33, the truck weighed 8,380 and carried 13,145 or more than 50 per cent. over its own weight.

McIntyre, No. 6, which finished with clean score in Division 3K

Many of the trucks are too heavy for the work they do. Much weight can be cut out in places. It takes motor power to carry the truck's own weight along, and if 2,000 pounds can be cut off the weight of a 5-ton truck, it should make the carrying capacity of that truck commensurately greater; it should reduce the tire upkeep on that truck; and it should reduce the general wear and tear. It is poor economy to load up with heavy parts if smaller ones will do. If ordinary steels will not give adequate strength without using enormous mass, then the natural solution is to use better steels and cut down the size of the parts. There is much to be done in this respect.

With the small delivery the proportion of car weight to load will never be as favorable as with the big truck, on the ground that a small truck requires almost as many pieces in its make-up as a big truck does. There is not much difference in the weight of a magneto needed on a small car and that needed on a big truck. The same holds true with many other parts.

As the brake table on another page shows, most of the contesting trucks were well braked. The rules allow 50 feet as a stopping distance in the brake tests. This is too much. For trucks of 5-tons or over and traveling at 6 miles per hour, 20 feet is distance enough. Some of them stopped in the amazing

distance of 3 feet, others in 4, 7, 8, or 9 feet, with only one set of brakes used at once. Trials were not made to show what distance would be required when both sets were used together.

In the brake tests, with lighter trucks, the distances ranged from 20 to 50 feet. Many of the 1-ton trucks using large wheels, but not large enough drums, should have larger brakes.

The inadequacy of the brakes on the lighter vehicles was proven by the number of accidents these vehicles suffered by running into street cars, heavy horse trucks and into one another. Many of the accidents were due to the brakes locking the wheels and the truck skidding on the car tracks into street cars. This suggests the necesity of additional brakes.

When being operated in congested city traffic zones a 1-ton truck traveling 10 miles per hour should be able to stop in a distance of 20 feet, and if brakes cannot be fitted to accomplish this, then some additional form of brake, which would contact with the street pavement, might be introduced.

Locking of the wheels is the most dangerous factor in a brake for a solid tire and the designers should aim at a brake which will take hold gradually and not lock the wheels. Once the wheel, shod with a smooth solid rubber tire, is locked it loses obedience to all laws and simply skids. If in a street car track it will skid along a terrific distance; and if on a pavement it will wreck itself against the curb or some other vehicle. Larger brake drums will aid in accomplishing this end. The maker must not be satisfied with a brake that will simply lock the wheel, this is not the acme of brake perfection by any means, it must do more—apply gradually and retard the wheel, without destroying that friction condition between tire and street surface.

Little Giant, No. 12, came through the entire test without a single demerit

MOTOR STATISTICS OF THE COMPETING VEHICLES

No.	Vehicle	No. of Cylinders	Bore	Stroke
1	Mercury	2	4¼	4
2	Mercury	2	4¼	4
3	Clark	4	3¾	5
4	Buick	2	4½	5
5	Sampson	2	4¾	4¾
6	McIntyre	4	4½	5½
7	Crown	4	3¾	4½
8	Krickworth	2	5	5
9	Clark	4	3¾	5
10	Clark	4	3¾	5
11	LeMoon	4	4	4
12	Little Giant	2	5	4
14	Adams	4	3¾	5
15	Swanson	2	5¼	4¾
16	Lauth-Juergens	4	4	4
17	Lauth-Juergens	4	4	4
18	Decatur	4	4	4
19	Monitor	2	5¼	4¾
20	Chase	3	4⅜	4
21	McIntyre	4	4 5/16	4¾
22	Stegeman	4	4⅛	5¼
23	Reliance	2	5	5
24	Mais	4	4	5¼
25	Alco	4	5	6
26	Old Reliable	4	4¾	5½
27	Durable Dayton	4	4¾	5¼
28	Pope-Hartford	4	4½	5
29	Saurer	4	4.3	5.5
30	Stegeman	4	4¼	5½
31	Sampson	4	5	5½
32	Alco	4	5	6
33	Saurer	4	4.3	5.5

A sample of the street conditions met with in South Chicago on the first day

Georgians to Tour State and See Races

ATLANTA, GA., Sept. 25—Final plans for the Tour Around Georgia were made at a meeting held here recently. According to present plans the tour will start November 22 and last 11 days. Only 6 days, however, will be spent on the road. The rest will be in Savannah where the tourists will be on hand for both the Grand Prize and the Vanderbilt races.

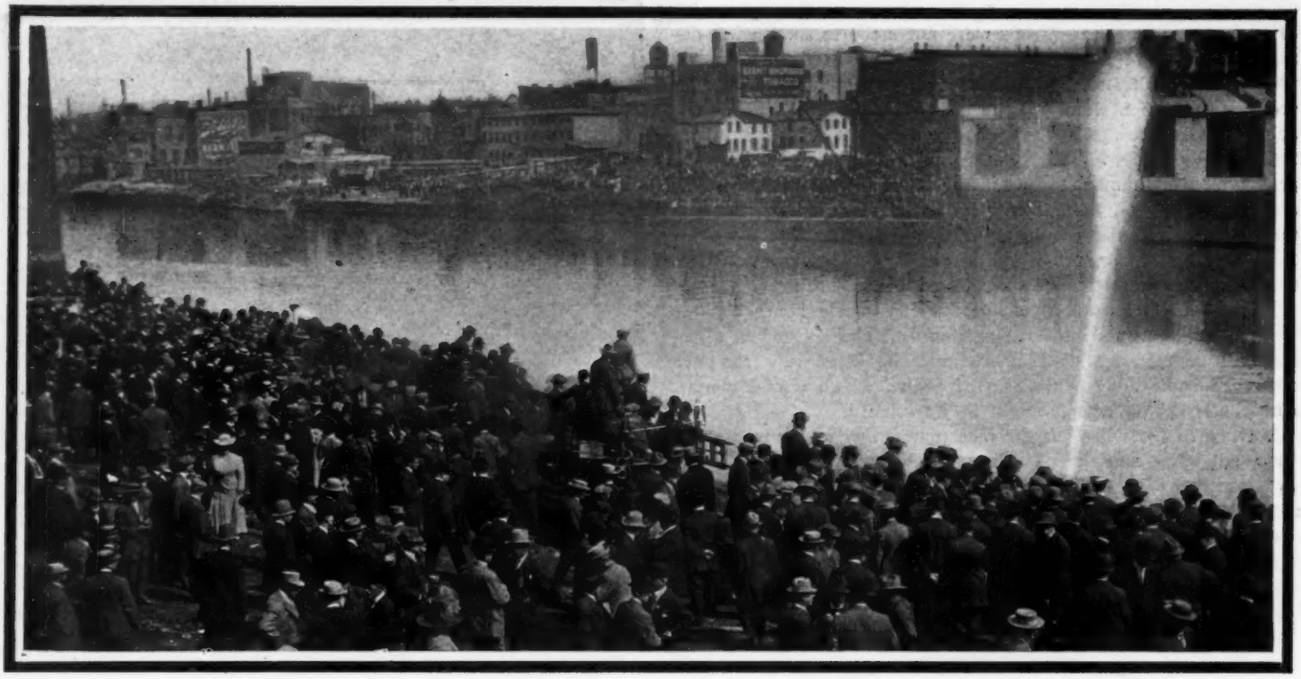
The exact list of prizes has not been announced, but already $3,200 has been subscribed for this purpose. The city of Savannah has made a special prize offer of $600 to the town or city sending the greatest number in proportion to its population.

The scheme is to start the tour from Atlanta, November 22. The first day's run will be to Americus, 149 miles, with a stop at Zebulon for lunch. The next day the tourists will journey to Valdosta, covering 137 miles. There will be a stop at Albany and a lunch at Thomasville. The third day's touring will get the tourists to Baxley, 133 miles; a noon control at Waycross.

The exact route of the fourth day's run, which is to Savannah, will be the subject of further scouting. The route is 105 miles.

In Savannah the tourists will have 5 days to view the two big races and to tour over Chatham County's excellent roads. After the running of the Grand Prize the tourists will take up their journey again. The first noon control out of Savannah will be Statesboro and the night control Doblin, 125 miles. The following morning the tourists will run to Macon and that night will complete their journey to Atlanta, 152 miles.

The heavy trucks weathered the mushy streets without great difficulty



Immense crowds witnessed the test of motor fire pumps at Milwaukee during the recent exhibition

Fire Chiefs See Apparatus Tested

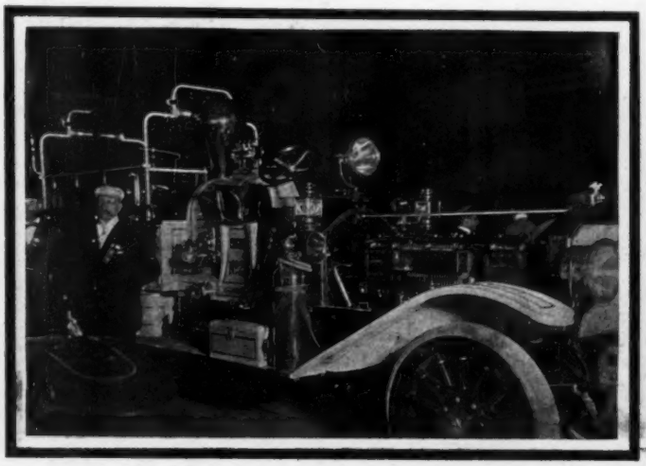
MILWAUKEE, WIS., Sept. 22—Motor-driven fire apparatus was the feature of the thirty-ninth annual convention of the International Association of Fire Engineers which closed here to-day. In fact, it was generally remarked that the parades and the exhibition at the Auditorium were as much a show of automobiles as of strictly fire-fighting rigs. Of the twenty exhibits of fire-fighting apparatus there was only one that was not gasoline propelled and only two pumping engines that were not operated by gasoline. One of those was a steamer which had been converted from a horse-drawn rig to a modern form by the substitution of a motor for the horses. In the pumping engine tests only gasoline-driven pumps took part.

Following is the official report of the tests:

Test No. 1. American-LaFrance Fire Engine Company, Elmira, N. Y. Double motor (six cylinder each) pumping car; horsepower of motor, 200; cylinders, 5 1-2-inch bore 6-inch stroke; pump capacity, 300 to 800 gallons per minute. Discharged 262 gallons per minute through 1,000 feet of 2 1-2-inch hose and 1 1-4-inch ring nozzle; pump pressure, 270 pounds; suction pressure, 5 pounds; net pressure, 275 pounds; nozzle, pressure, 56 pounds. Duration of test, 7 minutes.

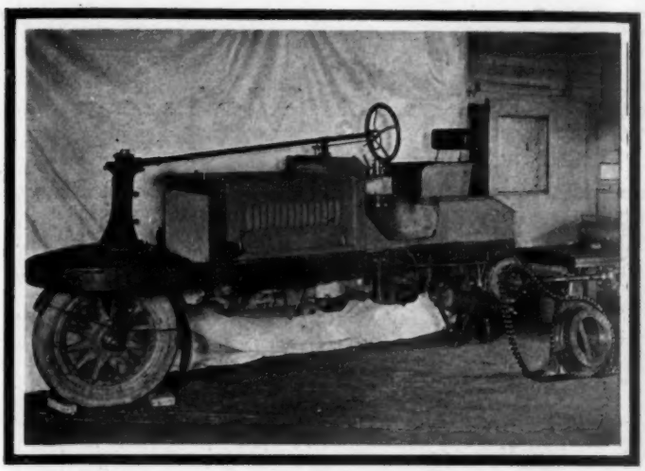
Test No. 2. American-LaFrance Fire Engine Company, Elmira, N. Y. Same machine as in test No. 1. Discharged 322 gallons per minute through 1,000 feet of 2 1-2-inch hose and 1 1-2-inch smooth nozzle; pump pressure, 275 pounds; suction pressure, 5 pounds; net pressure, 280 pounds; nozzle pressure, 23 1-4 pounds. Duration of test, 15 minutes.

Test No. 3. American-LaFrance Fire Engine Company, Elmira, N. Y. Same machine as in tests Nos. 1 and 2. Discharged 645 gallons per minute through two 500-foot lengths of 2 1-2-inch hose, with one 1 1-8-inch smooth nozzle and one 1 1-4-inch ring nozzle; pump pressure, 225 pounds; suction pressure, 5 pounds;

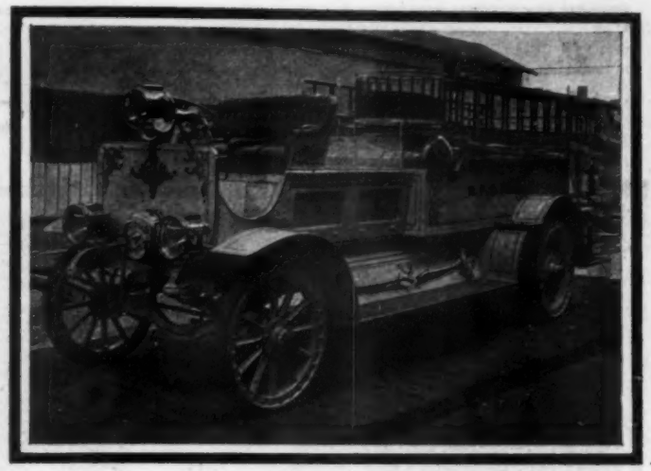


Robinson pump and hose wagon, a compactly arranged combination

Ahrens-Fox pumping engine with pump located in front of radiator



The Martin tractor, for drawing various forms of fire apparatus



The Seagraves combination hose and chemical wagon

net pressure, 230 pounds; nozzle pressure, 79 pounds. Duration of test, 5 minutes.

Test No. 4. American-LaFrance Fire Engine Company, Elmira, N. Y. Same machine as in tests Nos. 1, 2 and 3. Discharged 825 gallons per minute through four 100-foot lines of 2 1-2-inch hose, siamesed into a deluge set with 1 3-4-inch nozzle; pump pressure, 100 pounds; suction pressure, 7 pounds; net pressure, 107 pounds; nozzle pressure, 82 1-2 pounds. Duration of test, 5 minutes.

Test No. 5. American-LaFrance Fire Engine Company, Elmira, N. Y. Four-cylinder motor-pumping car. Horsepower of motor, 70; cylinders, 5 1-2-inch bore, 6-inch stroke. Pump capacity, 450 to 500 gallons per minute. Discharged 264 gallons per minute through 1,000 feet of 2 1-2-inch hose and 1 1-8-inch smooth nozzle; pump pressure, 216 pounds; suction pressure, 5 pounds; net pressure, 221 pounds; nozzle pressure, 49 1-2 pounds. Duration of test, 5 minutes.

Test No. 6. Same machine as test No. 5. Discharged 444 gallons per minute through two 500-foot lines of 2 1-2-inch hose, each with 7-8-inch smooth nozzle; pump pressure, 166 pounds; suction pressure, 6 pounds; net pressure, 172 pounds; nozzle pressure, 96 pounds. Duration of test, 5 minutes.

Test No. 7. American-La-France Fire Engine Company, Elmira, N. Y. Six-cylinder motor pumping car. Horsepower of motor, 100; cylinders, 5 1-2-inch bore and 6-inch stroke. Capacity, 600 to 700 gallons. Discharged 249 gallons per minute through 950 foot of 2 1-2-inch hose and 1 1-8-inch smooth nozzle; pump pressure 188 pounds; suction pressure, 3 pounds; net pressure 191 pounds; nozzle pressure, 44 1-2 pounds. Five minutes.

Test No. 8. Same car as test No. 7. Discharged 425 gallons per minute through two 500-foot lines of 2 1-2-inch hose and 7-8-inch smooth nozzle; pump pressure, 153 pounds; suction pressure, 3 pounds; net pressure, 156 pounds; nozzle pressure, 89 pounds. Duration of test, 5 minutes.

Test No. 9. The Ahrens-Fox Fire Engine Company, Cincinnati, Ohio. Six-cylinder motor pumping car. Horsepower, 72; pump capacity, 400 to 500 gallons per minute. Discharged 244 gallons per minute through 1,000 feet of 2 1-2-inch hose and 1 1-8-inch smooth nozzle; pump pressure, 185 pounds; suction pressure, 5 pounds; net pressure, 190 pounds; nozzle pressure, 42 1-2 pounds. Duration of test, 15 minutes.

Test No. 10. Same machine as test No. 9. Discharged 340 gallons per minute through two 500-foot lines of 2 1-2-inch hose, with 7-8-inch smooth nozzles; pump pressure, 93 pounds; suction pressure, 4 pounds; net pressure, 97 pounds; nozzle pressure, 56 1-2 pounds. Duration of test, 5 minutes.

Test No. 11. Webb Motor Fire Apparatus Company, St. Louis, Mo. Six-cylinder motor pumping car. Horsepower, 80; pump capacity, 600 gallons per minute. Discharged 246 gallons per minute through 1,000 feet of 2 1-2-inch hose and 1 1-8-inch smooth nozzle; pump pressure, 170 pounds; suction pressure, 3 pounds; net pressure, 173 pounds; nozzle pressure, 43 pounds. Duration of test, 3 minutes. Test of this car discontinued on account of lubricating device not working satisfactorily.

Test No. 12. Same company. Another car, six-cylinder, horsepower, 80. Pump capacity, 600 gallons per minute. Discharged 224 gallons per minute through 1,00 feet of 2 1-2-inch hose and 1 1-8-inch smooth nozzle; pump pressure, 157 pounds; suction pressure, 4 pounds; net pressure, 161 pounds; nozzle pressure, 36 pounds. Duration of test, 5 minutes.

Test No. 13. Same car as test No. 12. Discharged 361 gallons per minute through two 500-foot lines of 2 1-2-inch hose and 7-8-inch nozzle; pump pressure, 113 pounds; suction pressure, 6 pounds; net pressure, 119 pounds; nozzle pressure, 63 1-2 pounds. Duration of test, 7 minutes.

Test No. 14. Same car as tests Nos. 12 and 13. Discharged 589 gallons per minute through two 100-foot lines of 2 1-2-inch hose, siamesed into a deluge set with 1 3-4-inch nozzle; pump pressure, 68 pounds; suction pressure, 9 pounds; net pressure, 77 pounds; nozzle pressure, 42 pounds. Duration of test, 5 minutes.

The Seagraves aerial ladder, with four-wheel drive and steer, one of the interesting exhibits at the Milwaukee show

In the Making of Poppet Valves

Fig. 1—Method of calibrating valves in order to determine the truth of the seats in relation to the stems

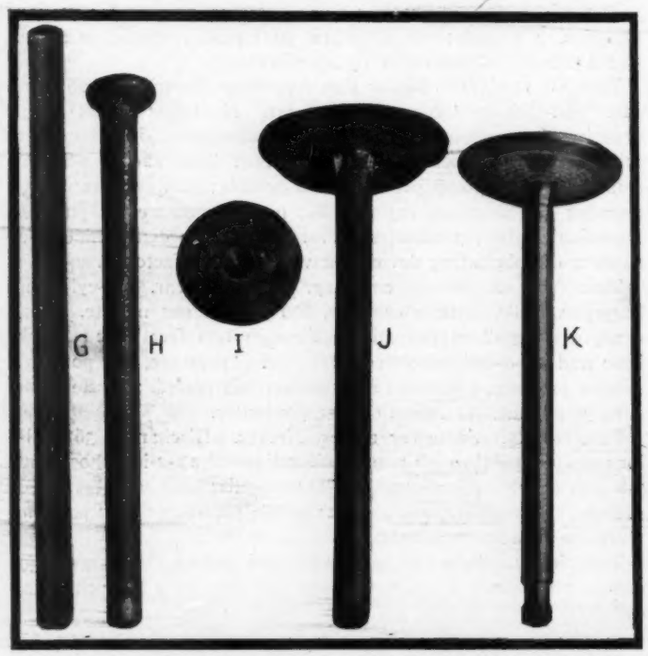


Fig. 2—Components of the built-up valve, showing the various stages of development of valve stems and mushroom welded to it

IT is proposed here to show the various stages of manufacture of the poppet valve from the rough material to the finished product. It may surprise some to know that eleven operations are necessary to make a valve, without counting such operations as calibrating and transporting from one machine to the other.

Much has been written of late of different types of valves other than the poppet, which may have created in some people's minds the impression that the death-knell of the poppet valve has been sounded. There does not seem to be any abatement on the part of manufacturers in the use of this type of valve, and one has but to think of the marvelous results that have been achieved with it in the last few years to make it apparent to the veriest tyro that if anything is to come along to supplant it the innovation will have to possess merits out of the ordinary.

A few years ago, when makers were still groping around in the dark without any fixed purpose, except perhaps to make the cars that were turned out run passably well, it was more or less a case of follow-my-leader, and the errors that were made by one manufacturer were copied by the plagiarists of that particular car. It is still within the memory of many that certain cars were taken as prototypes and were copied, lock, stock and barrel. Since the science of building automobiles has developed and the difficulty of making cars run has been overcome, the attention of designers was directed to silencing the road locomotive.

In the earlier days not a little noise emanated from the valve mechanism and this was one of the first things to be attacked in a serious manner. With the poppet valve of the present day, properly made and its operating mechanism carefully designed, there is no reason why noise should be in evidence. The little extra touches of finesse that are added to racing cars deprives them of silently operating valves, as the cams employed for such machines have a different contour from valves used on touring cars. The reason for this is that the valves that control the flow of the gases are in a measure responsible for the amount of gas that is taken into the cylinders; a slow-closing valve which may be quiet will not give the snap to the machine that is the desired quality of a racer. The weight of the reciprocating parts is another point to be considered, but this will be dealt with later. Before dealing with the operation of the valves it will be as well to show how the part is manufactured, taking the various operations seriatim. The finished valve does not look so formidable that it should be requisite to spend

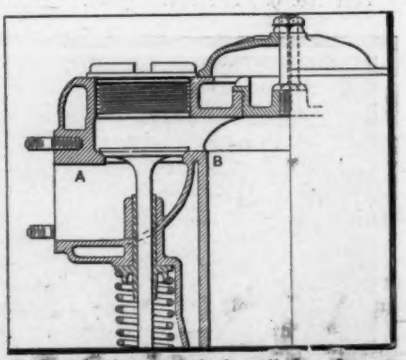


Fig. 3—Section through the cylinder of a motor in which the water-cooling area is bad

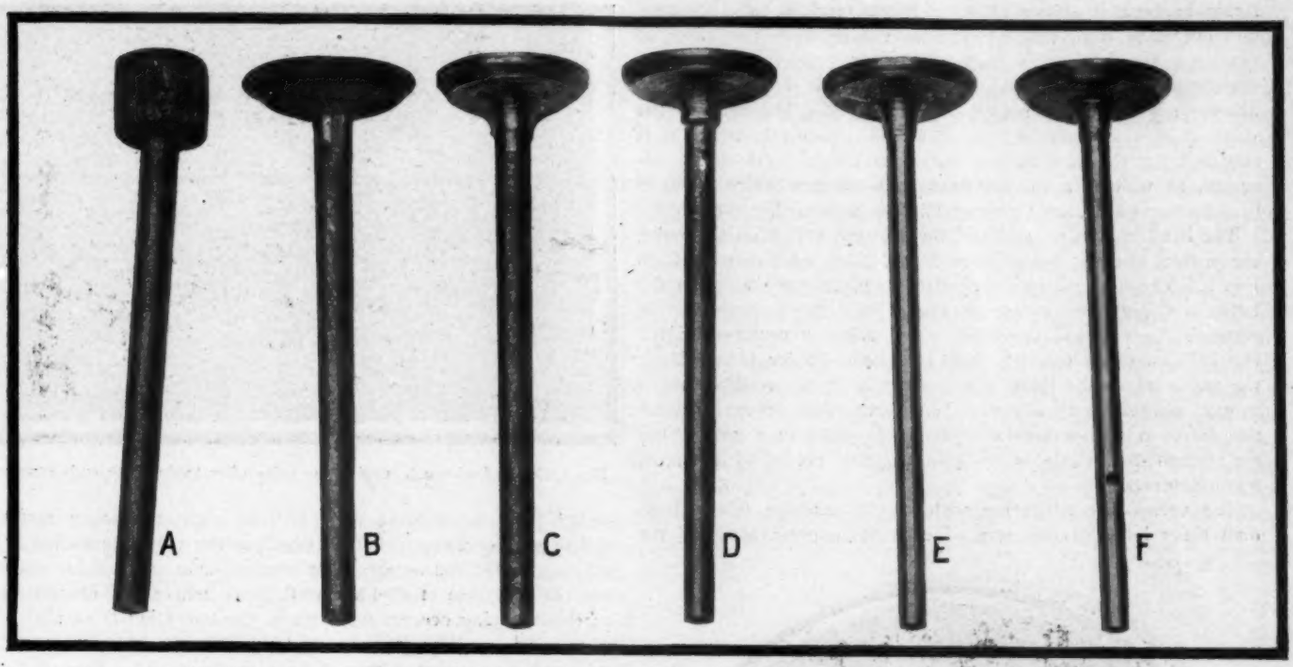


Fig. 4—Showing the appearance of a valve at its different stages of manufacture from the solid rod

much work upon it, but it is not always the part that looks simple that is the easiest to make.

There are two types of poppet valve in vogue at present in gasoline motors. The difference lies in the seat of the valve. The majority of motors have valves with cone seats, but some prefer the flat-seat type. The advantage claimed for the cone type is that it is less liable to pit at the seats, owing to the angularity of the seat being better swept by the flow of the exhaust gases. In case a valve cannot seat there will be a gap on one side and not on the other.

Referring to the question of gap, this may be caused by the deformation of the valve itself, due to improper water-cooling area around the seat. Unless this area is uniform the seat will heat at one point more than another and prevent the valve from properly closing. In the case of the intake valve this may cause a blow-back in the carbureter, but as the heat of the burnt gases passing out of the exhaust passageway materially increases the temperature of the ports the trouble above-mentioned is more likely to obtain in the case of the exhaust valve than with the intake. The consequence would be that owing to the improper seating of the exhaust valve part of the compression would leak past and the motor would not be able to develop its full power. A comparison of two motors in which the difference in the water cooling around the valve is shown in Figs. 3 and 5. In Fig. 3 is shown a solid wall around the valve seat at the point A, while B is bathed by the cooling water. Fig. 5 shows a uniformity at J1 and J2, which will keep the temperature balanced.

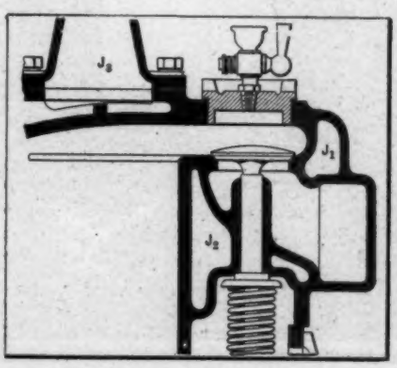


Fig. 5—Section through a valve pocket showing how the entire seat is properly cooled

Besides the methods about to be illustrated there are others that apparently give good results; but those shown being the more commonly employed, it is proposed only to deal with them. In order to differentiate between the two methods of manufacture it may be as well at the outset to designate them as the "stamping" and "building up" processes. Dealing with the stamping process, if reference be made to Fig. 4, the different forms that the valve takes during the various stages of manufacture will be seen. A shows the first stage in which a piece of rod is drawn on the hammer in order to form the stem. This operation is very simple and does not need any particular care, with the exception that the metal should not be overheated. The same applies to the next process, when the part as shown at A is heated before being placed in the die, shown in Fig. 9. In this illustration the head of the red-hot valve (V1) may be seen in the die (D1). The weight is allowed to drop twice, the upper half of the die (D2) battering the metal and forming the mushroom. The appearance of the valve as it leaves the

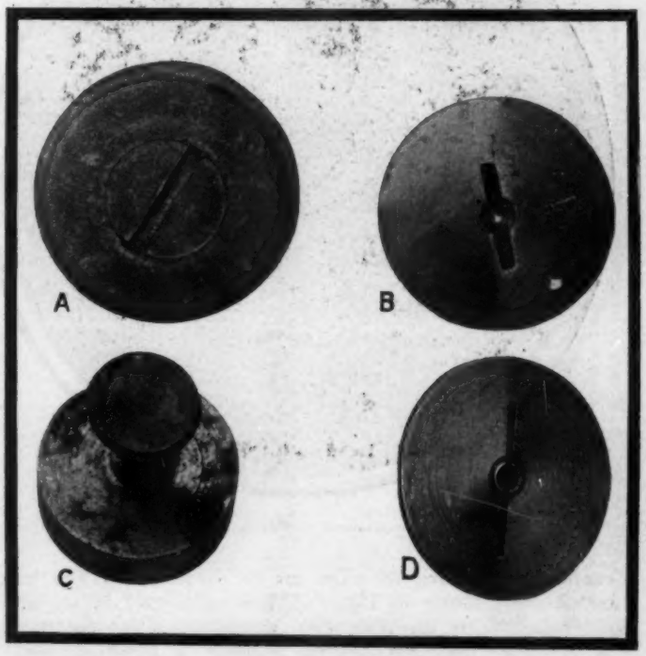


Fig. 6—A and B show the rough and finished valve stamped from one piece; C shows the metal before stamping, and D the finished valve

steam hammer is shown at B, in Fig. 4, and in order to save one operation, viz., that of slotting the head of the valve to receive a screwdriver to facilitate grinding, the upper part of the die has a protrusion which slots the head of the valve in a manner similar to that shown at A in Fig. 6. The head of the valve at B in this illustration shows the manner in which it is centered for the various machines into which it has to be inserted, as well as a small hole for the pointer which holds it in position and prevents it from slipping while being turned.

The head is then ground and the seat cut rough on the lathe, the correct contour being given to the fillet, as shown at C in Fig. 4. The next operation consists in placing the valve in the lathe in the manner shown in Fig. 8 in order to turn up the stem to the required thickness. The valve is centered in the chuck (C) and the tool (T) held in the tool-holder (H). When the valve leaves the lathe it is practically in the rough—that is to say, unfinished. It is possible by using other cutters to finish the valve so that it would be ready to place in a motor, but the present-day methods of grinding are preferred by most manufacturers.

The valves are next transported to a machine where boys drill three holes in the stem of each valve preparatory to the

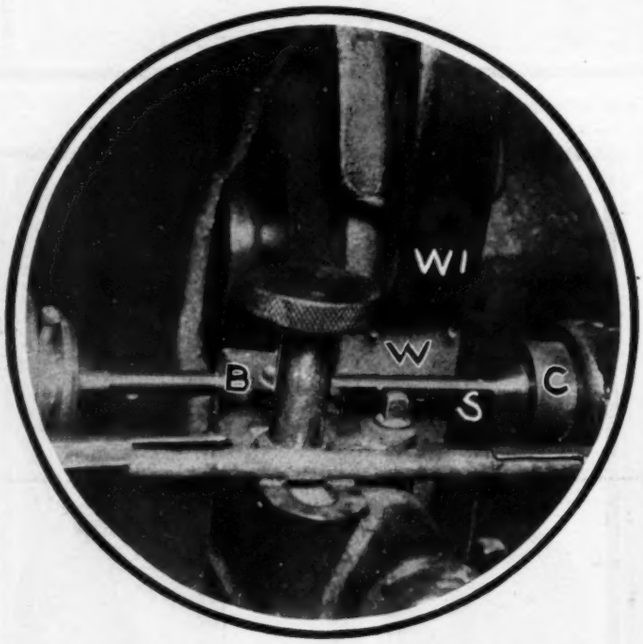


Fig. 7—Showing the grinding operation for the stems of valves

operation of cutting the slots for the cotter pins. The latter operation is shown in Fig. 11. The valve (V) is placed in the receptacle in the plate (P), which has a slot cut therein at S. The chuck (D) of the hammer is furnished with a slotting tool (C) held in position by the setscrew (S1). As the weight falls the slotting tool cuts the metal between the holes that have been previously drilled, but the blow is apt to slightly bend the stem of the valve.

It is a simple matter to rectify this and the operation of straightening the stem is shown in Fig. 10. The operator is furnished with a tool that has two centers into which the valve is placed and sufficient tightness is furnished by the milled nut (N) to hold the valve in position. The valve laying alongside the machine shows the amount of disalignment that has to be corrected. The operator spins the valve and with the aid of a piece of chalk (C), held in his left hand, the high spot can be located. Usually a single blow with the hammer (H) at this point will be sufficient to correct this, but it may require several blows before the valve is again true. The operation does not call for a great amount of skill, consequently unskilled labor is employed for this work with satisfactory results.

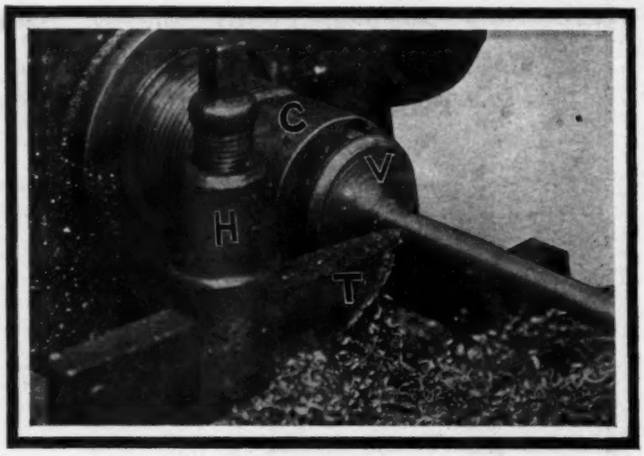


Fig. 8—Method of rough turning the valve after having both ends centered

The next operation, that of grinding the valve stem (Fig. 7), may be performed in the same machine that is used for grinding the seat, but at the Maxwell plant, where the illustrations of the stamping process were made, the operation is carried out in two stages. The valve head is placed in the lathe center (C) and a lathe carrier causes the valve to rotate. In order to avoid any whip in the spindle when the pressure of the grinding wheel (W) is brought to bear upon it a split block (B) forms a rest for the spindle. The valve stem rotates in a clockwise direction, while the grinding wheel (W) revolves in an anti-clock wise sense, a steady stream of water being meanwhile fed through the pipe (W1) to the part being ground. The valve, after the stem has been ground, is shown at E, in Fig. 4. The last operation in the manufacture is illustrated in Fig. 12, in which the valve (S1) is centered in the head of

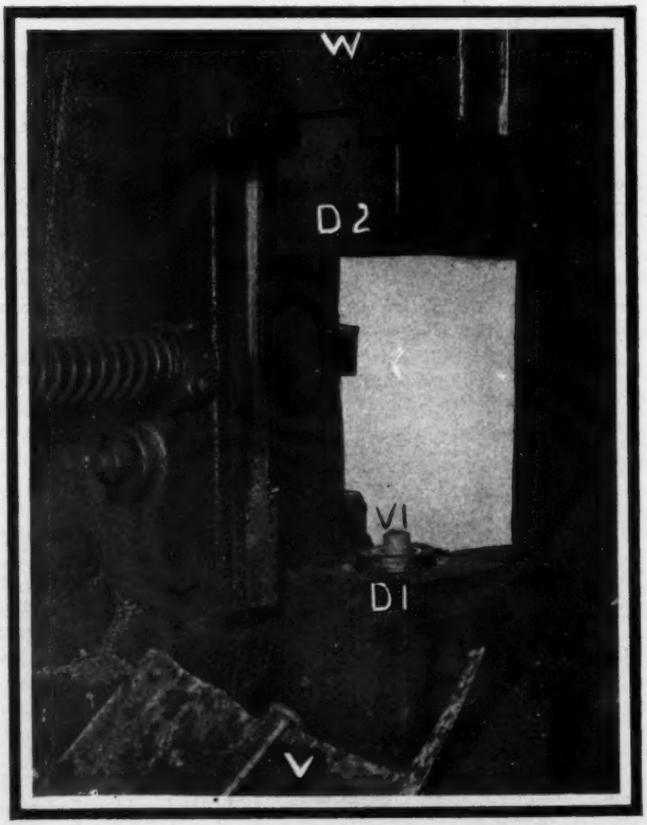


Fig. 9—Showing the hammer with the valve in position ready to be stamped

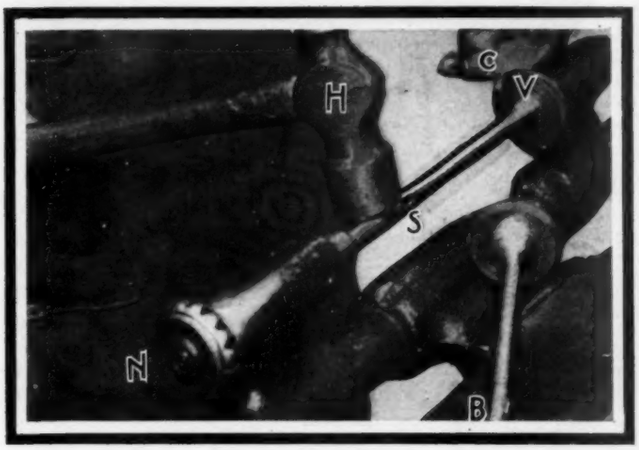


Fig. 10—Truing up the stem of a valve after cotter pin slot is stamped

the lathe (C) and attached to the chuck (C1). The valve is caused to rotate in the opposite direction to the grinding wheel (W) and water is fed, as in the stem grinding operation, through the pipe (W1). The finished valve is shown at F, in Fig. 4.

The method of building up the valve from two parts instead of stamping it from the solid, as already described, may be seen very clearly by referring to Fig. 2. In the case of the stamped valve it is of a necessity that the entire valve be of the same material, whereas in the built-up valve a different material may be used for the seat to the stem. In the illustration referred to the process is as follows: The stick of .15 carbon steel G is compressed at the top extremity so as to present a form similar to H, in Fig. 2. A disc I, 11-16 of an inch thick and 1 3-4 inches in diameter, is cut from .05 nickel steel stock, drilled with a 1-2-inch hole and placed over the stem in the manner shown at C, in Fig. 6. The assembly is then heated and placed in a die in a manner similar to that shown in Fig. 9, and the two parts are thus welded together. The form that they take is shown at J, in Fig. 2. The thickness of the head after welding is reduced to 7-16 of an inch, and the width increased to 2 3-4 inches. The finished valve is shown at K, in which the thickness of the head, after turning, is 9-32 of an inch and the diameter of the upper face 2 15-16 inches. D, in Fig. 6, shows the head of the valve after being turned and slotted. The illustrations of the assembly process were taken at the Mercer plant, and it will be noticed in K, in Fig. 2, that the base of the stem is slightly smaller in diameter in order to accommodate a split ring for holding the valve spring in place.

Fig. 1 shows a process sometimes resorted to in order to determine whether the stem and seat are absolutely concentric. The valve is chucked and rests lightly on the holders (H2 and H3), and by rotating the valve by hand, it is possible to read on the dial of the instrument (E1) the most minute fault in the manufacture. A valve may seat quite well on one of the valve seats, but as all valves at the present day are being made interchangeable, it is necessary that all shall be alike.

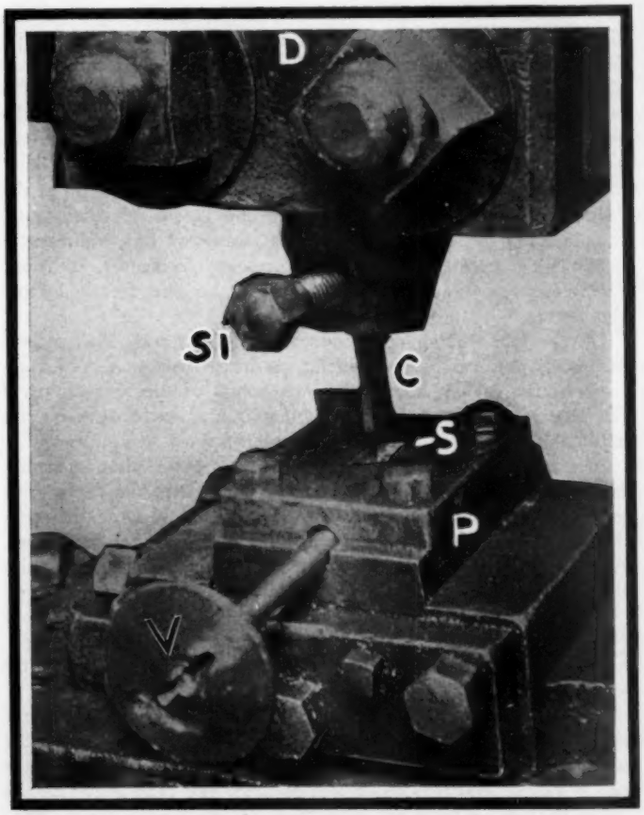


Fig. 11—Slotting machine with which the slots in the valve stem are cut

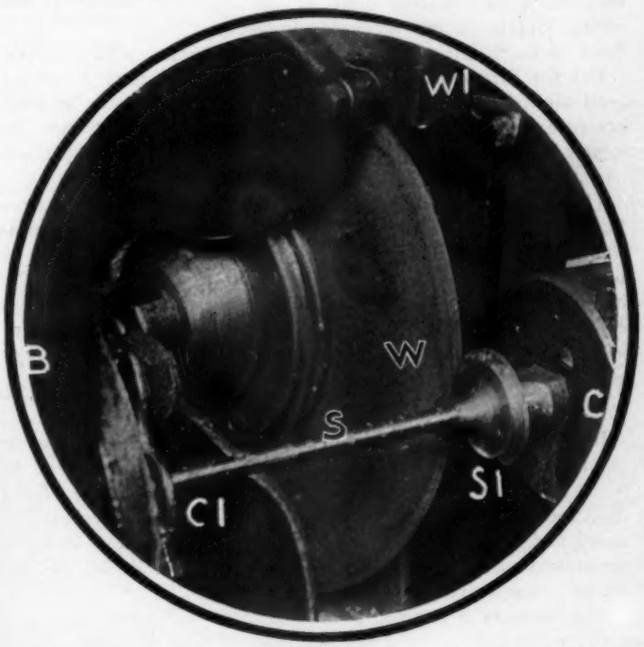


Fig. 12—Grinding the seats of valves, thereby giving a true surface

Steel Should Be Tested for Nitrogen

Steel of unknown origin should be tested for nitrogen rather than for phosphorus. The popularly accepted idea that phosphorus and an excess of sulphur cause brittleness—an idea which finds expression in most specifications for steel materials—should be corrected as promptly as possible by placing under ban nitrogen first of all, as this substance may be found in all kinds of steel while phosphorus and sulphur are unlikely to exceed 0.06 per cent. in either acid or basic open-hearth steel. That nitrogen is the impurity to which the comparative brittleness of Bessemer steel is mainly due was first pointed out by Braune, a Swedish chemist living in Paris, but while it is always present in unrefined Bessemer steel it may be found in open-hearth steel as well. Nitrogen in excess of 0.06 per cent. should never be admitted for boiler plate, for example. (The boiler explosions in the French navy have made this subject one of national importance in France.) The author has repeatedly argued the question of the cause of brittleness in steel before the British Iron and Steel Institute since 1885.—C. E. Stromeyer in *La Technique Automobile et Aérienne*, February and March.

Stresses and Strains in Tires

Part III.

Translation of an article by Henri Petit from La Technique Automobil et Aérienne

THIS high coefficient of security shows that a tire cannot burst under normal conditions through an additional excess of pressure.

The tension of the canvas being always proportional to the internal pressure it can be seen even in the most unfavorable case, viz.: that of a 135 m.m. tire that it would be necessary to raise the internal pressure to 56 kilos to arrive at a tearing point of the canvas. In practice the tire will probably burst before this limit is reached, owing largely to the inevitable imperfections of manufacture due to the unequal tension of the canvas.

But the fact remains, however, that practical tests that have been carried out by the simple means of increasing the internal pressure in order to burst a tire have been without result; in nearly all cases the rims become deformed, allowing the beads of the tire to fly out before the tire shows signs of weakness.

The fears possessed by certain chauffeurs of having their tires burst in the sun are mere myths, in most cases. The amplification "most cases" is used because it is evident that if a tire is old and the canvas has been subjected to the action of the humidity to the point of becoming rotten (which is a state that exists more often than one would think, for although the tire looks to be in good condition) a burst can very easily take place.

Action of the Temperature

It is interesting to note the influence of the temperature on the internal pressure in tires. Suppose a tire to be inflated at 0° to a regular pressure of 10 kilogs. During the course of the day, under the simultaneous action of the sun and especially the speed and weight of the car, the imprisoned air can attain a temperature of 80° Centigrade, consequently producing an increase of pressure.

The pressure p attained at this moment will equal:

$$p = p^\circ (1 + \alpha t)$$

that is to say,

$$p = p^\circ \left[1 + \frac{80}{273} \right]$$

$$= p^\circ \times 1.3 \text{ about.}$$

The pressure will only rise in the third of the primary value. The proportional increase of the tension on the canvas for a tire in good condition is more or less a negligible quantity.

Further, when one talks of the causes of deterioration of tires it will be seen that the action of the heat on the rubber is more important than on the internal pressure.

Action of Weight on Tension of Canvas

All that has previously been stated refers to a tire simply inflated and not carrying any weight.

There is nothing to be modified in the conclusions drawn if one only passes to a practical case where the tire rests upon the ground and carries a weight P. (It will be remembered that we are only interested at the moment in static efforts—that is to say, the case when the tire is stationary.)

Under the influence of the charge the tire will flatten out until the force exerted by the internal pressure on the surface of contact equilibrates the weight supported.

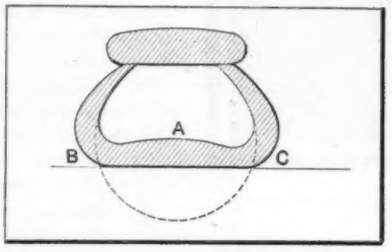


Fig. 4—Showing change in form of meridian section of insufficiently inflated tire

Allowing for the stiffness of the canvas it can be seen that we will have the equation

$$p\,s = P$$

calling s the surface of contact of the tread with the ground and measured in square centimeters.

This contact area is not in the form of a well-defined geometrical form. It can be likened to an ellipse, the greater axis of which lies in the lateral plane of the wheel. This ellipse will be proportionally lengthened according to the narrowness of the tire and the increase in diameter of the wheel.

It can be seen that the work necessary for the propulsion of the car is dependent on the form of this surface, and is greater according to the relation of the large and smaller axis being smaller.

The flattening of the tire produces a depression in the interior of the casing and the volume thereof diminishes slightly due to this flattening. The increase in pressure is quite insignificant and need not be considered. The point which must be borne in mind, however, is the change in the form of the meridian section of the tire at the point of contact with the ground. Fig. 4 shows in an exaggerated form what takes place.

If the tire were very narrow or, on the other hand, formed of a single layer of canvas this deformation would not be of great importance. But as the various layers of canvas present a considerable thickness, it follows that to pass from the normal form to the form represented in Fig. 4 the layers of canvas will slide on one another. This displacement is possible owing to the layer of rubber compound interposed between each layer; the rubber stretches at the points extended and contracts at the others, permitting a small relative displacement.

It is clear that this sliding should be as small as possible; the tensions that are developed between the layers of canvas and their coating of rubber develop, as a matter of fact, values proportionately greater as the displacement increases, tensions which could in time cause the rubber to become detached from the canvas.

On the other hand, on account of the hysteresis that accompanies all physical phenomena, in the present case the deformations of the rubber, during the movements of the revolutions of the wheel successive deformations of the diverse sections are accompanied with a considerable production of heat.

In a large measure it is due to this that a tire that is insufficiently inflated (or overcharged, which comes to the same thing in the case under notice) heats more than the same tire submitted to the same charge, but inflated to a greater degree. Another cause of heating lies in the friction of the tire with the ground; this will be dealt with later.

Method of Attachment

The tire is held in position in the rim by the pressure of the air on the beads.

It is interesting to form an idea of the greatness of the force that holds the tire in position. The tire in the vicinity of the sides of the bead is submitted to the action of two forces: the one Φ (superficial tension) tends to draw the bead outward, the other F (arising from the internal pressure) has on the contrary action of forcing the bead into the base of the rim (Fig. 5).

On account of the form of this latter, it is possible for the bead to turn around the point A (allowing for the resistance of the canvas). Then the force Φ is applied at the middle of the thickness e of the tire at this point. Its moment in relation to the fixed point A is equivalent to

$$\frac{\Phi \times e}{2}$$

The force F is applied at the middle of the interior width of the bead. It is normally at the surface. Its moment in relation to A is

$$\frac{F l}{2}$$

In order that the bead should be maintained in position, one must have

$$F l > \Phi e$$

For the unity of the length of the tire the force F is equal to:

$$p \times l$$

The force Φ is the maximum meridian tension of the tire. It is expressed by

$$T_M = \frac{R r}{R - r} p$$

From which

$$p F > p e \frac{R r}{R - r}$$

The resultant couple, which we will call the couple of security, will be equal to the difference of the components

$$C = \frac{p}{2}\left[F - e \frac{R r}{R - r} \right]$$

It should be positive and have as large a value as possible.

Let us calculate this value for current dimensions of tires (90, 120, 135).

The value of C can be written

$$C = \frac{p}{2}\left[F - e \frac{R}{\frac{R}{r} - 1} \right]$$

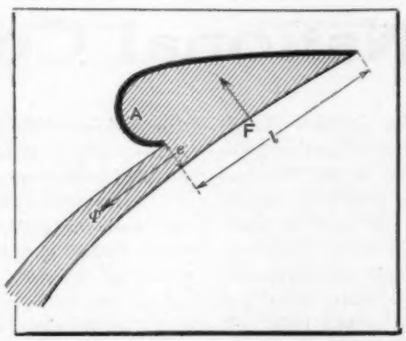


Fig. 5—Showing forces acting on bead of tire

From the foregoing it becomes at once apparent that C will be proportionately smaller as $\frac{R}{r}$ decreases in size.

The values of $\frac{R}{r}$ are given in the table earlier in the article.

The minimum values are:

7 for tires 700 × 90
6 for tires 820 × 120
5.5 for tires 895 × 135

It will be remembered that for each section $\frac{R}{r}$ is proportionately smaller as the size of the wheel is smaller.

The corresponding value of $\frac{R}{\frac{R}{r} - 1}$ are respectively

3.5 6.3 8.5

The thickness e is approximately equal to 1 millimeter per layer of canvas as:

6 millimeters for a tire of 90 m.m. section.
8 " " " 120 " "
9 " " " 135 " "

But for a 90 m.m. section tire the width of the bead is about 23 millimeters.

From which for C

$$C = \frac{p}{2}\left[2.3^2 - 0.6 \times 3.5 \right]$$
$$= p \times 1.6$$

8 kilo-centimeter per centimeter.

It is necessary, therefore, that the width of the beads increase with the tire width.

To obtain a like value for C with a tire 895 × 135 (taking into consideration the internal pressures) it is necessary to make the beads 33 millimeters wide.

These figures, though seeming to be void of interest in themselves, nevertheless should be borne in mind.

Harking Back a Decade

THE *Motor Review* of September 26, 1901, contained the following items indicating the growth of the new automobile industry:

Announcement is made that an American factory for the Charron was to be installed with a capacity for the 1902 season of 100 cars a month.

The Washington Auto-Vehicle Company was incorporated for $1,000,000 to manufacture pleasure cars and parts, and it was announced that in the future the company would take up the manufacture of army automobiles, fire apparatus and cars for various kinds of municipal and government work.

It is noted that Ray MacDonald and Howard Freeman, former bicycle stars, had taken jobs as chauffeurs with the Automobile Company of America.

A. J. Eddy, of Chicago, who completed a trip from his home to Boston and New York in a single-cylinder Winton, two weeks before the publication date, expressed himself as being confident that American automobiles were better for cross-country touring than foreign machines.

Exports of automobiles and parts from the United States for the week ending September 18, 1901, amounted to $24,000. During July, 1901, the automobile exports were valued at $72,000.

Announcement was made that W. D. Gash, of the Waltham Manufacturing Company, had been made sales manager for the Searchmont Motor Company.

W. B. Felker, of Denver, recounted his experience in climbing Pike's Peak, using the abandoned wagon road up that mountain. The round trip required over fifteen hours, using his steam Locomobile. At that time the climb represented a new altitude record for the automobile.

Great preparations were being made for the Fort Erie race meeting, which project had been revived after being called off on account of McKinley's assassination. The Automobile Club of Buffalo hung up silver cups for the winners in the various classes, for which twenty-one entries were made.

The Consumers' New York Rubber Tire Company, incorporated by W. H. Seaich, John W. Horner, Alfred D. Moulton, Hooper C. Barrett and Andrew C. Farnsworth, was announced.

The leading patent outlined in that week's issue was No. 682,194, granted to Henry K. Hess, of Philadelphia, on a steam automobile using charcoal or other carboniferous fuel in solid form instead of liquid hydrocarbon.

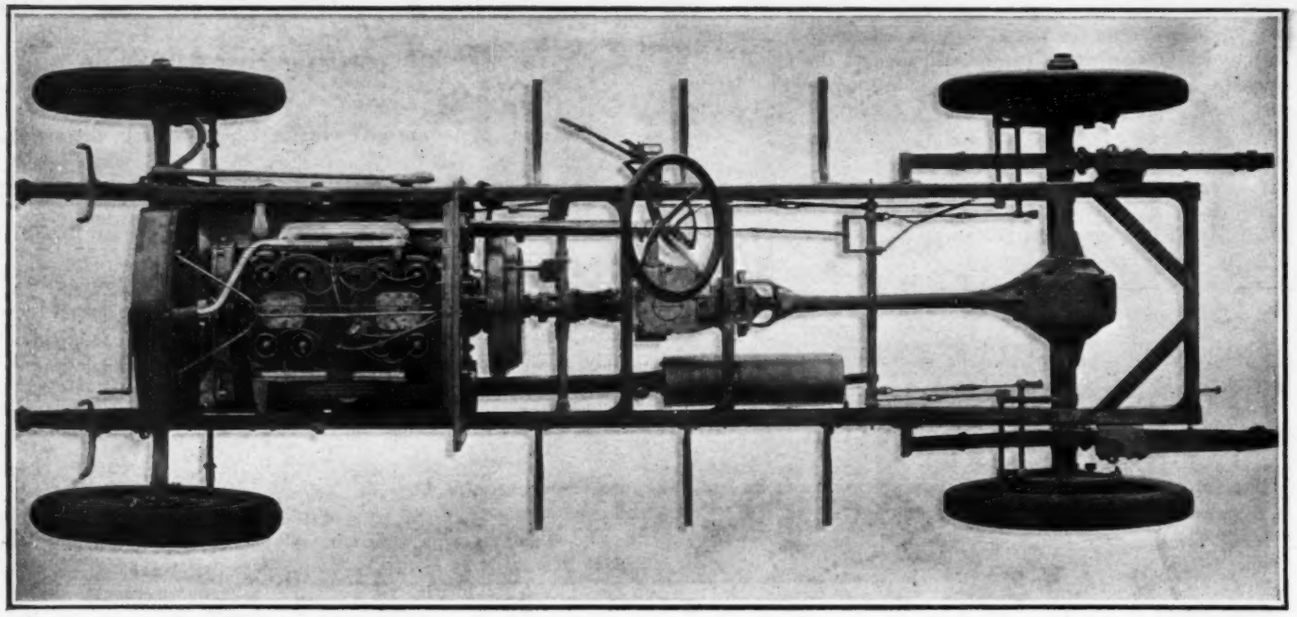


Fig. 1—Looking down on the National chassis, showing power plant, suspension and assembly of units

Details of National Construction

NO marked changes characterize the new season's models of the National Motor Vehicle Company, of Indianapolis, Ind. The new models will be known as the National "40," Series S, and a numerical suffix will be used to designate the particular style of body. The changes that will be made will be along the line of refinements, in view of a year's experience, both on the road and in the racing field. Improvements in manufacturing operations designed to eliminate wear and noise have been carefully studied and nothing has been left undone to render the car satisfactory in every way.

The general appearance of the chassis may be seen from the plan view shown in Fig. 1, which discloses a four-cylinder motor attached to the main frame, cone clutch, three-speed transmission, and live rear axle drive. The method of operating the brakes is also shown in this illustration.

The motor has four cylinders, cast in pairs, and thoroughly annealed, the bore being 5 inches and the piston travel 5 11/16 inches. Fig. 5 shows a front transverse section through one-half of a cylinder together with the base chamber. The cylinders are cast with T-heads and the intake and exhaust valves, which are made of nickel steel, are placed on opposite sides. The valve V has a cone seat S1 and reciprocates in a bushing B which is inserted into the cylinder casting. The cam operation may be seen by referring to the cam C1, upon which a roller R rides. The push-rod P1 is fitted at its upper extremity with adjusting nuts N, and the roller R is held in constant contact with the cam C1 by means of a spring S2.

The method of attaching the exhaust manifold E and the water manifold W is unique. The yoke Y has a forked end F and a single arm A so that when the nut N1 is tightened upon the stud S both manifolds are maintained firmly attached to the cylinders, thereby eliminating a large number of connections.

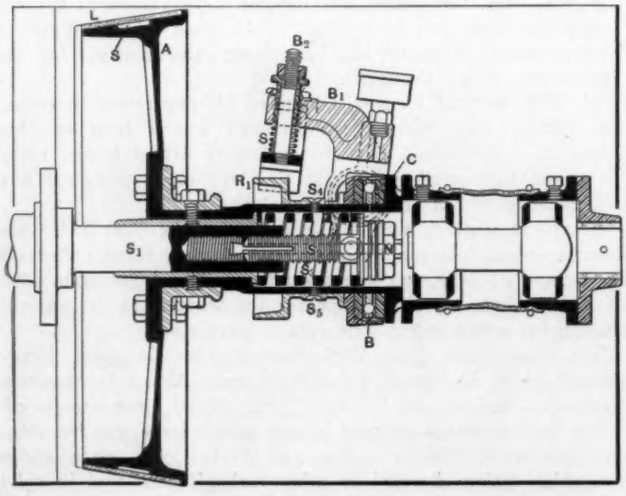


Fig. 2—Detailed view of the National cone-type clutch and universal joint

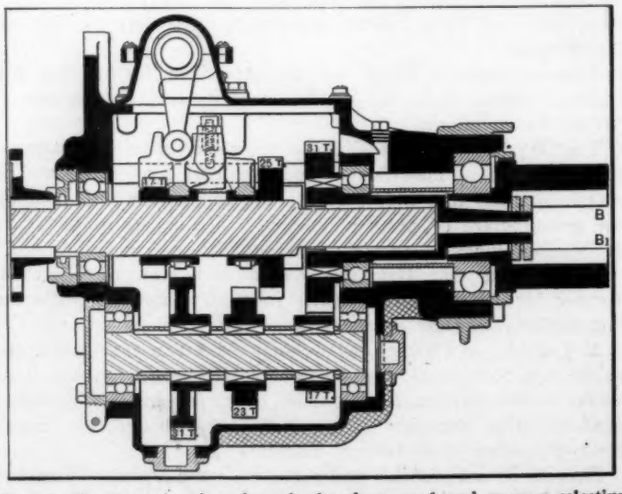


Fig. 3—Horizontal section through the three-speed and reverse selective transmission

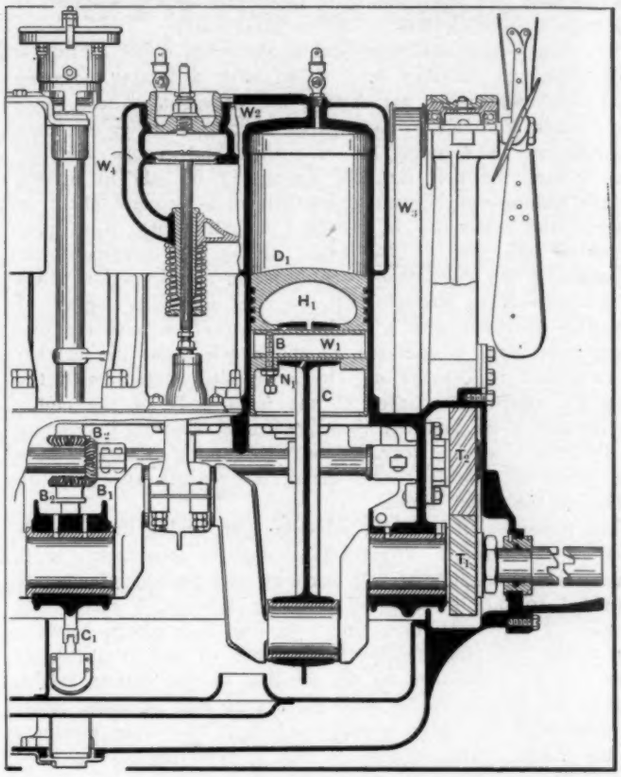


Fig. 4—Plan section of National motor, showing oiling, ignition and cooling systems

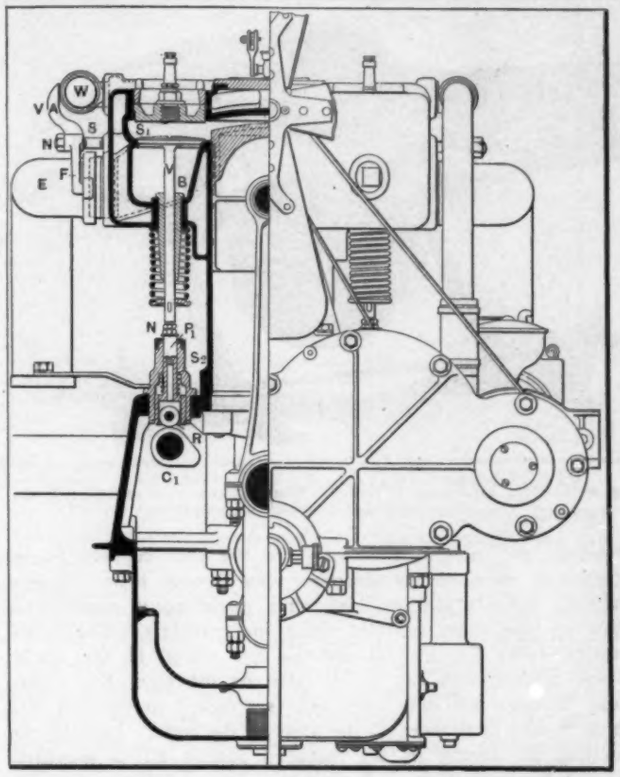


Fig. 5—Front transverse section through an engine cylinder and part of the base-chamber

The plan section of the motor, Fig. 4, discloses the method of operating the oil pump and distributor by means of bevel gearing B1, B2 and B3. The pistons have a slight dished top D1 and the wrist pins W1 are hollow. The method of mounting the piston wrist pin and connecting rod is shown in this illustration, and it will be seen that the wrist pin and piston are united by means of the bolt B and locked in position by the nut N1. This allows the connecting rod C to oscillate upon the wrist pin W1 and the small end of the connecting rod has a hole drilled above in order to permit the lubricant to enter. The oil pump being driven by the shaft attached to the bevel gear G2 can be removed from the lower half of the base chamber without disturbing the position of the above-mentioned gear wheel, as there is a tongue joint C1 interposed between the pump shaft and the operating shaft.

The water jacketing of the motor is shown at W2, W3 and W4, which illustrates the manner in which the cylinder is cooled to the point where the heated gases obtain.

The timing gears T1 and T2 are skew-cut, a practice which has been found to eliminate a considerable amount of noise from these parts. The crankshaft is mounted on three main bearings, made of Parsons white bronze.

Fig. 6 shows the exterior view of the motor. From this it will be seen that the support S1 by means of which the motor is attached to the frame at its forward extremity is bolted to the upper half of the aluminum base chamber instead

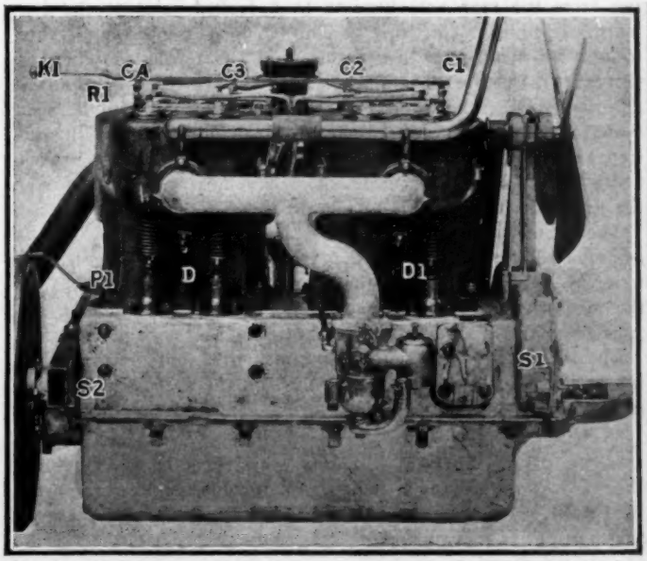


Fig. 6—Intake side of motor, showing substantial supporting members, carbureter and cocks to drain water from jackets

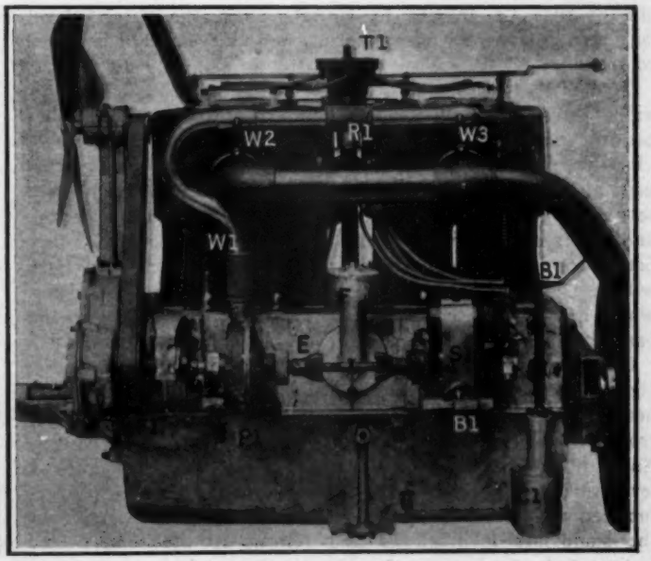


Fig. 7—View of the exhaust side of the motor, showing magneto, water pump, oil filler hole and cork-float indicator housing

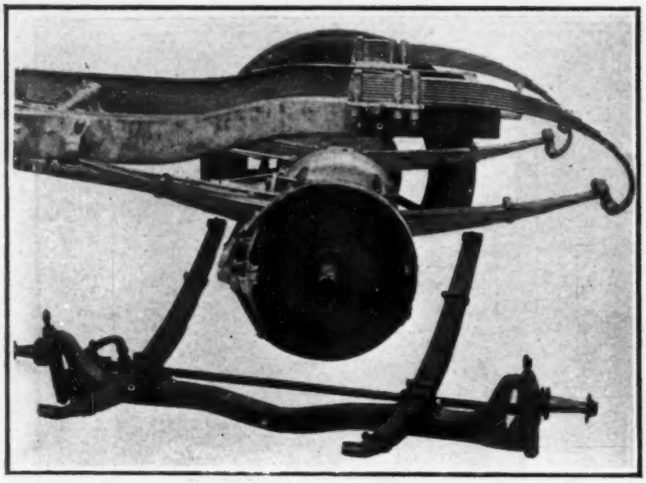


Fig. 8—Showing suspension of National front and rear axle, as well as brake construction and differential in perspective

of being cast integral therewith and the rear support S2 is attached to the motor by means of long through bolts. Draincocks D and D1 are provided, thus rendering it possible to drain off the water entirely from the cylinders. The compression cocks C1, C2, C3 and C4 are placed in the heads of the cylinder and can be operated by the knob K1, which passes through the dashboard and is attached to the rod R1, which in turn is attached to the arms of the cocks. In order to facilitate the timing of the motor a pointer P1 is provided and the flywheel is marked with the various settings for the valves and the ignition.

The exhaust side of the motor is shown in Fig. 7, in which the timer T1 can be seen. The fan pulley F1 and water pump P1 are driven by gearing from the half-time shaft, and the water is conveyed from the pump, which is of the centrifugal type, to the pipe W1 and enters the cylinders at the points W2 and W3, a piece of rubber tubing R1 being placed between the two pipes to take care of any vibration. Tapered nipples are used on the intake, exhaust and water pipes, thereby doing away with all packing joints.

The pump shaft carries an extension E which drives the intermediate shaft I, which in turn drives the magneto. By undoing the strap S1 it is possible to remove the magneto from its base B1 and all alignment between magneto and pump is taken care of by the shaft I. Oil is poured in the base chamber through the large filler F, a cork float within the housing C1 serving to indicate when the correct level has been attained by means of a small ball which is attached to the float.

Two sets of spark plugs, located in the valve caps, are provided, and besides the magneto ignition a separate and independent ignition is provided by means of storage battery, single vibrator coil and distributor. Either or both systems may be used at will. A double distributor, Splitdorf magneto, with two sets of plugs and storage battery is used on the roadster model, and this system fires both sets of plugs simultaneously, either battery or magneto. The carbureter is of the float feed type, with a 1¾-inch connection on all models, except the roadster, which has a 2-inch connection. A metal strap attached to the base chamber holds the body of the carbureter rigid.

Oil is taken from the base by a pump and delivered to the sight feed on the dash, whence the oil is returned to the main bearings. A false bottom is fitted inside the base, forming troughs for the connecting rod scoops to dip into. A continual flow occasioned by the pump fills these troughs to a level sufficient to insure proper lubrication and prevent overlubrication. When the level of the oil becomes higher than the standpipes it overflows and returns to the sump. The pistons and cylinders are lubricated by the splash of the connecting rods and above the main bearings cups are provided to maintain a constant flow of oil to these parts.

The clutch is a cone type and is shown in detail in Fig. 2. The aluminum member A is faced with a leather covering L, beneath which six flat springs are provided. These cause the leather to bulge at six points, thereby insuring an easy engagement. The spigot S1 is drilled and tapped and accommodates the bolt S2; the spring S3 is held in tension by the locking nut N, and disengagement is brought about by causing the collar C1 to recede. A ball thrust B is provided to take care of the thrust during the disengagement. Attached to the disengaging arm there is a bracket B1 which is fitted with a through bolt B2, the lower extremity of which is provided with a leather-faced surface. As the disengagement arm is operated by the clutch pedal the bracket B is caused to descend and to come into contact with the ring R1, which is attached to the main body of the clutch by set-screws S4 and S5, thus preventing continued spinning of the clutch when disengaged and facilitating changing from one speed to another. The spring S prevents any gripping action of the clutch brake.

The transmission is of the selective type, giving three speeds forward and reverse. The shafts, as may be seen from Fig. 8, are carried upon annular ball bearings, and packing glands are provided so that oil can be used for lubrication instead of grease. A universal joint, shown in Fig. 2, is placed between the clutch and transmission, taking care of any disalignment that may be occasioned by the bending of the chassis frame, due to inequalities of the road surface as well as slight faults of assembly. The gear is supported upon two cross members of the chassis frame, as may be seen by referring to Fig. 1.

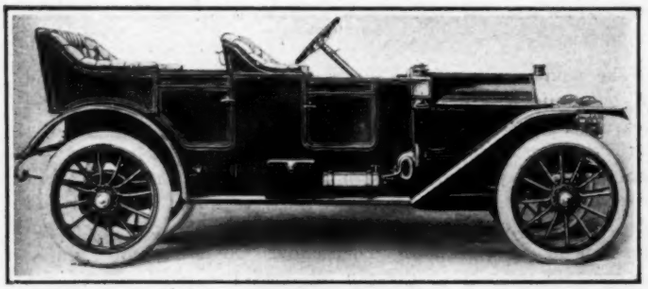


Fig. 9—Side view of seven-passenger, fore-door type of touring car and neat arrangement of accessories on footboard

Power is transmitted from the gearbox to the live rear axle by a 1⅜-inch propeller shaft enclosed in a casing extending from the rear axle housing to a forked joint at the forward extremity. This fork is hinged upon a bracket attached to a cross member of the frame, and the torque is taken up therein. A section of the live rear axle, which is of the full floating type, is shown in Fig. 11, from which it will be seen that roller bearings are employed throughout. This illustration also shows the method employed for operating the brakes, acting upon the rear wheel drums. By removing the cover over the rear axle it is possible to remove the differential parts.

The suspension in the National is taken care of by means of semi-elliptic springs at the front, attached to an I-beam axle, as shown in Fig. 8; the rear suspension, however, is of the three-quarter elliptic type and the method of attaching the springs to the chassis frame is shown in the same illustration.

The wheels are fitted with 36 x 4-inch tires, but the buyer has the option of choosing 34 x 4 1-2-inch on the speedway roadster and 37 x 4 1-2-inch upon the touring cars and the limousines.

MANY of the Sheffield, England, physicians have abandoned their horses and carriages and gone in for automobiling for practical use. Fifty per cent. of the cars in use in Sheffield are of the high-power touring type. The same rule prevails throughout the United Kingdom.

To Fit Car to Buyer

(Extract from a paper read before the British Institute of Carriage Manufacturers in London, Sept. 4, 1911, by Mr. Herbert Austin.)

IF at the commencement of the automobile era it had been possible to realise the extent of its use to-day, and of the demand for speed and luxury, closer attention would no doubt have been paid to the creation of a vehicle designed to meet the entirely different conditions caused by the advent of the new means of locomotion. This evolution is going on every day, and perhaps the gradual change is for the best, as had it been too sudden the public might have objected more strongly than it did, and the conditions appertaining to the use of the automobile would have been so much more difficult to cope with.

The demand to-day is for seats to be low, and they must, therefore, be sloped downwards toward the back. This means taking up more room lengthwise on the chassis, and unless the accommodation at the back can be curtailed the body must overhang more or the chassis will have to be lengthened to conform with the requirements.

To be able to provide for variations in the dimensions of drivers and the positions they wish to be fitted, an adjustable seat has been designed by the author. This seat can be placed in any position that could possibly be required, and attached to it is a steering column and pedals. All the holes for adjustment are marked so that a record can be taken of the position most convenient to the customer and enabling the manufacturer to copy the dimensions found in the car delivered to the buyer.

Of course, the positions allowable with a standard body are limited, and these limits are noted on each design. Some provision would have to be made in the steering column and pedals for each make of chassis, but this would not be a big matter.

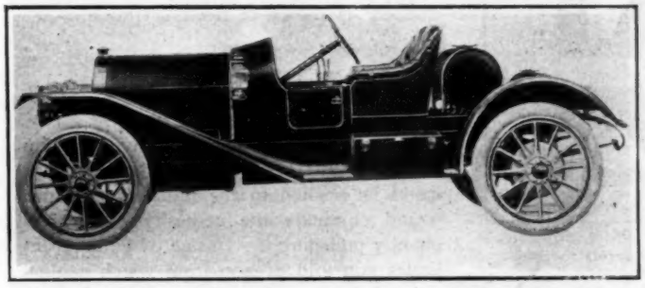


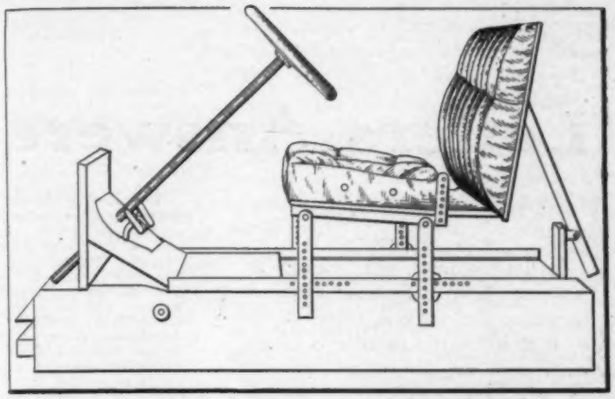
Fig. 10—Showing the National speedway roadster, indicating comfort for the driver and showing large gasoline tank

The space between the seatboards and the footboards was always considered a convenient place to put spares and tools in, but this is gradually disappearing, the total height of the seat being now much lower and the cushions much thicker than they were formerly.

On a long journey when driving a car having a low-confined seat considerable discomfort is sometimes experienced in being forced to keep to one position, and in hot weather the discomfort is accentuated. With the higher seats and more upright steering column formerly used, one could move about a little, and in this way prevent to some extent the fatigue arising from continued driving.

An adjustable driving seat is no novelty on a horsed-carriage, and as it is infinitely more necessary to be able to sit in a suitable position to drive a car, an adjustable driving seat will become popular on some types of automobiles as soon as the public awakes to their advantages.

Where both the brake and change-speed levers, or only the former are outside the front seat panel, the height of the arm rest to driver's seat is important, particularly on some makes of chassis. Even an extra inch will make it extremely uncomfortable to operate the levers which are outside the confines of the car body.



Adjustable seat, with dummy steering wheel and pedals, to enable the builder to fit the car seat to the buyer

Heat Due to Combustion

ACCORDING to accepted authority, the fuel values in British thermal units per pound of the contents of gasoline are as follows:

Carbon burned to carbon monoxide	4,100 B.t.u.
Carbon burned to carbon dioxide	14,500 B.t.u.
Hydrogen burned to water	62,032 B.t.u.
Hydro-carbons burned to carbon dioxide	20,000 B.t.u.

From the above it will be seen that a small proportion of hydrogen in the exhaust products of combustion of a motor represents an enormous weight. It will also be noted that unburned gasoline in the exhaust represents a very considerable waste, and that carbon monoxide, if it exists instead of carbon dioxide, lowers the thermal value of the fuel as used from 14,500 to 4,100 British thermal units.

Correct Tire Pressures

There is great variation in the pressures recommended by the different tire manufacturers. The following is probably a fair average for ordinary loads on the wheels:

Diameter of tire, Inches	Air pressure in tire. Lbs. per sq. in.
2½	45
3	55
3½	65
4	75
4½	85
5	90
5½	95

Lower pressures are used by some, especially for light loads. The pressures run considerably higher in several cases for heavy loads.

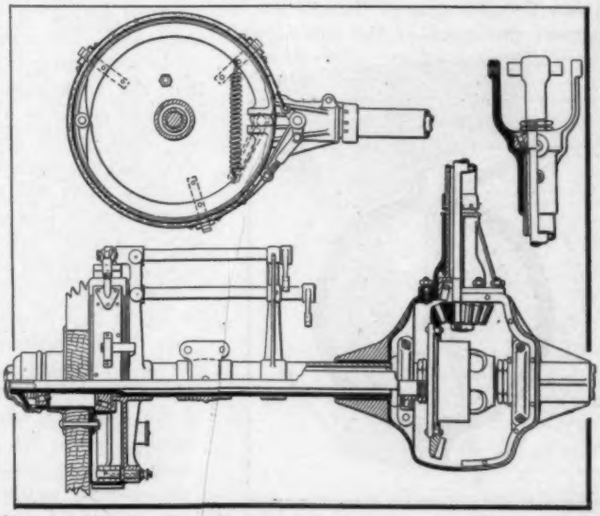


Fig. 11—Transverse section through National rear axle assembly, showing details of brake construction and differential

Letters Answered and Discussed

Hole in Throttle Valve

EDITOR THE AUTOMOBILE:

[2,842]—Would you please inform me how to fit a set screw or other device on the throttle valve of the motor so that when the throttle is closed as far as it will go the engine will still turn over at slowest speed. The valve is of the butterfly type.

CHAS. SINGER.

New York City.

With a butterfly valve the simplest way of making the adjustment you speak of is to cut a small hole in the valve, as shown in Fig. 1. The hole may be made very small at the start and gradually increased in size until the engine will just carry the car at the lowest possible speed on level ground.

It would be too much of an undertaking to go about fitting a set screw in the case of a valve such as this, and while it would have the advantage of being adjustable at any time this advantage has not enough weight to overbalance the difficulty of making a home-made fitting of this nature.

Engine Loses Power

Editor THE AUTOMOBILE:

[2,843]—Since THE AUTOMOBILE offers to give its opinion to subscribers as to the nature of the trouble and the remedy therefor, when the motor or other working parts of the car are out of order, I am taking the liberty to ask a question.

There are a number of car owners besides myself who are troubled by the fact that the engines will run very well while new, but after they have been run for a short time the advancing of the spark fails to augment the speed of the engine, and the throttle alone is of use. Consequently

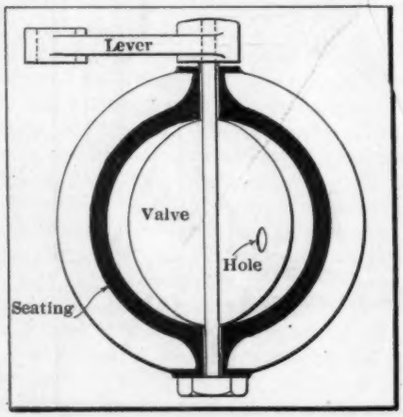


Fig. 1—Butterfly throttle valve with hole cut in valve to permit of slow running

The Editor invites subscribers to communicate their automobile troubles and personal experiences, stating them clearly on one side of the paper. If the nature of the case permits, send a sketch, even if it be rough, in order to assist to a clearer understanding. Each communication will receive attention in the order of its receipt, if the writer's signature and address accompany it as an evidence of good faith. If the writer objects to the publication of his name, he may add a nom de plume.

the engine has not the full power it had at the beginning.

PHILIP NADIG.

Allentown, Pa.

Any motor will run at its best if the spark is advanced as far as possible without the slightest sign of a knock being obtained. If the spark is at this point while running on level ground the greatest effort possible from the engine is being put into driving the car. When ascending a hill, however, the spark will be considerably retarded owing to the slower motion of the motor. The reason that an engine falls off in power after it has been run awhile is that the compression has become leaky owing to piston or valve leaks. The latter are often caused by a particle of carbon which has become lodged beneath the valve. A pitted valve will often be the cause of a considerable loss of power, and the defective member cannot well be remedied by grinding, as the pits will be deeper than it is advisable to grind. In a case of this kind it is best to purchase a new valve at once, or if within the makers' guarantee have them replace it.

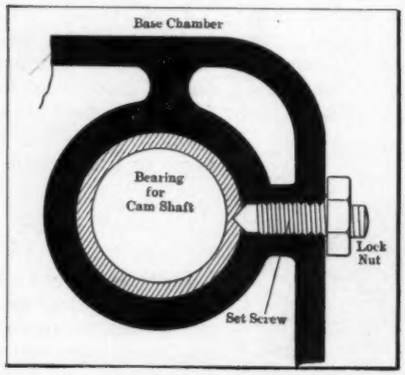


Fig. 2—Manner of fitting set screw to hold camshaft bushing in place

Insufficient lubrication is another cause of the loss of power. A new car always requires more lubrication than a car which has been run for a length of time.

Worn gears on the camshaft drive often cause a loss of power owing to the fact that they alter the valve timing.

Loose Bearing Bushing

Editor THE AUTOMOBILE:

[2,844]—The camshaft bearing bushing on my car is loose and shifts its position while the engine is in motion. The trouble is not at all serious, as I am well aware; still I would like to fasten the bushing in position, as I am afraid it will wear considerably if left as it is. I am therefore taking the liberty of asking you the best way to remedy it. Do you think a pin should be driven into the bushing?

L. T. MOOSE.

Canton, Pa.

A pin would not be so advisable as a set screw, which could be fitted in the manner shown in Fig. 2. The screw is so slotted as to be turned by a screw driver, a lock nut is then placed over the screw in order to hold it in place while the engine vibrates. In drilling for the set screw care must be taken that the indentation in the bushing is not made so deep that it penetrates the metal. The correct distance is shown in the illustration.

To Darken Brass

Editor THE AUTOMOBILE:

[2,845]—I would like to have you inform me if there is any coating which could be applied to the brass parts which would eliminate the necessity of so frequently polishing it. In one of your recent issues you told of a coating which applied to such parts as could be removed from the machine and heated, but this of course is not applicable to windshields, etc. Any information you care to give me will be appreciated.

F. D. MARTIN.

New York City.

Prepared as here given lacquer will prove efficacious in renovating the bright work, but it is necessary to prepare the surfaces to be lacquered if the results are to be satisfactory. For the surfaces what is needed is a high polish and absolute freedom from grease. The lacquer may be prepared thus: Bleached shellac, 60 grams; Manila copal, freshly powdered, 60 grams; gum mastic, 60 grams; absolute (grain) alcohol, 1 kilogram; coarsely powdered glass, small quantity; allowed to stand for (frequently shaking), 14 days; boracic acid, 1 gram. Filter and use, the best plan being to apply repeated thin coats.

Any desired color may be given to the lacquer by adding aniline dyes. A very little of the dye of the color selected will serve for the purpose. Red and blue will form clear solutions; green must be han-

dled cautiously; it may have to be filtered; yellow is a good dye to handle. In applying lacquers it is desirable to go about it in the same way as shellac is applied—thin coats, deftly applied by means of a suitable brush, with very little rubbing; it will become tacky if it is fussed with very long.

To Open Crankcase Drains

Editor THE AUTOMOBILE:

[2,846]—Kindly tell me of a fitting which could be attached to the drain pipes on the crankcase of my automobile so that they could be opened without getting beneath the car. The way they are fitted at present makes them annoyingly inaccessible, especially if one has a good suit of clothes on at the time.

The drain cocks are fitted to standpipes which rise to the correct splash level, and hence when these drains are opened the excess oil will drain away. Any information you gave me would be greatly appreciated.

Chicago, Ill. SUBSCRIBER.

A handy method of opening the drain cocks is to have them arranged so that they are all opened at once. This is done by connecting all the cock handles to a rod and fitting a ring at the end, as in Fig. 3. To this ring a wire is fitted which is run to the front end of the car, terminating just below the radiator. In case it is desired to drain off the surplus oil, the ring on the end of the wire below the radiator is pulled and all the cocks will be opened. The wire is stiff enough so that the cocks can be pushed back to their closed position, which will be determined by means of a stop. If it is desired a spring may be fitted which will hold the rod in a closed position unless there is a pull on the wire.

Raises Magneto Question

Editor THE AUTOMOBILE:

[2,847]—What advantage has a high-tension magneto over the low? As I understand it, an engine will run just as well with a low-tension magneto as with a high, and at the same time one can crank on a low and not on a high. If the low is just as good, why the greater cost of the high?

Bango, Texas. J. K. STONE.

The high-tension magneto is practically nothing more than a low-tension magneto with a coil in the same casing. Hence the high-tension will cost more than the low since it is more complicated. Low-tension ignition, such as is used with the make-and-break system, is not as simple as the spark plug used with the high-tension system. In order to use a plug with a low-tension magneto a coil is necessary to produce a high-tension current.

The engine can be cranked when fitted with a high-tension magneto.

Air Cock on Intake

Editor THE AUTOMOBILE:

[2,848]—Several automobile drivers of my acquaintance have fitted a small pet-cock in the intake pipe, about 4 inches above the carbureter. After starting the engine with this pet-cock closed, and then opening it to obtain more air, a very noticeable increase in the speed of the engine will result. Again when a car is running at a speed of 20 miles per hour on the road, when this pet-cock is opened, the speed will increase from five to seven miles per hour.

The device has been tried on a variety of cars and in all cases the results have been practically the same—a greatly increased mileage per gallon of gasoline.

Kindly advise what you think of the idea and whether any bad effects will arise from its use.

FRED A. MOORE.

Croswell, Mich.

That the device works well after having been tried on several cars seems to indicate that it is of some merit, and it is natural when the reasons for it are examined. The modern carbureter, although a marvel of automatic flexibility, has to be adjusted so that all speeds will be equally well taken care of. If the carbureter were set so that the highest possible efficiency were obtained at high speeds it would probably be impossible to start the engine.

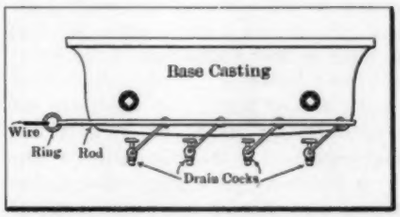


Fig. 3—How cocks may be connected so that they can all be opened at one time

The auxiliary air valve was invented for the purpose of supplying more air to the mixture after the engine gathered speed, but even with this valve the maximum efficiency cannot be obtained at every speed.

One objection to the cock fitted as you suggest is that the dust in the air will be drawn into the cylinder and will do some harm after awhile. If gauze were fitted to the cock and a handy means of varying the opening were placed on the dash so that it could be operated by the driver, it would be a useful adjunct in the hands of an able operator who desired to get all the good possible out of the car.

Gets Too Much Oil

Editor THE AUTOMOBILE:

[2,849]—I would be greatly obliged if you would tell me how to lessen the supply of oil given by the plunger pump in the oiling system of my new car. The supply is just enough greater than what is necessary, to make the motor smoke very unpleasantly. If you could help me out of the difficulty by publishing a solution of the problem in an early issue of your valued paper it would be appreciated.

Tuckahoe, N. Y. H. W.

Remembering the fact that it does not harm a new car to receive a little excess of oil, the adjustment may be made on the pump itself by regulating the length of the stroke. On nearly all plunger pumps there is a nut which may be turned down, thereby shortening the stroke. Since the amount of oil delivered by the pump is exactly proportional to the length of the stroke of the pump, this regulation will correct the fault.

Clutch Is Fierce

Editor THE AUTOMOBILE:

[2,850]—Would you kindly tell me how to remedy a clutch which picks up very suddenly? The clutch is of the leather-faced cone type and instead of picking up easily, as a clutch should do, it will grip with a very jerky pull as soon as it is engaged. If there is anything I can do to make the clutch less fierce I would appreciate it if you would direct me.

Tottenville, N. Y. L. K. H.

The repair can be very readily made at home if the garage is equipped with the average amount of tools, or if they can be borrowed or bought in the neighborhood. Referring to Fig. 4, a drilled piece P_1 is bolted to the male member of the clutch in such a way that P_1 is parellel to M. A tube P is placed about the bolt which passes through P_1 and a spring is inserted, so that the leather L is held against the flange B of the flywheel F. The bolts B_1 and B_2 are fastened tightly in order to prevent any working loose, while the bolt which passes through P_1 is held in position by a lock nut L_1 by means of which any adjustments may be made permanent. There should be at least four of these inserts placed upon the clutch in order to secure a uniform effect.

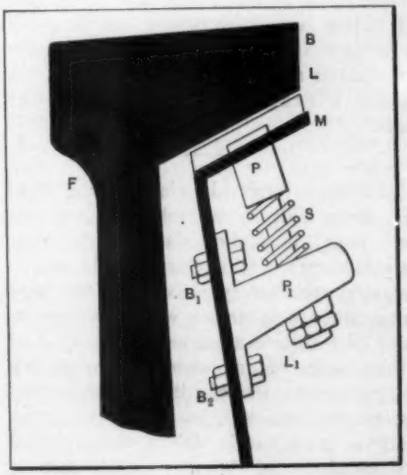


Fig. 4—Showing method of inserting springs in clutch to give easy engagement

Little Bits of Motor Wisdom

Pertinent Pointers for Repairman and Driver

USE OF FEATHER OR KEY—Where one shaft is forced to slide upon another and it is not desired to go to the expense of squaring the shaft for the length that the slide is required, a key or feather of the type illustrated in Fig. 1 is fitted. With a fitting of this nature the outer or sliding piece may work in either direction with very little resistance to its motion if the slide be well lubricated. This piece of mechanism is used to a large

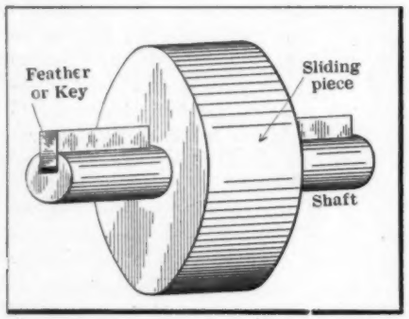


Fig. 1—Showing method of arranging feather or key as a guide for sliding piece

extent in change gear devices, the loose collar slipping along the shaft in either direction according to the motions of a hand lever which is fitted in such a manner that the operation of moving the different gears in mesh is in accordance with the conditions under which the automobile is traveling.

In operating the sliding sleeve by means of a lever, the usual method is to have a forked arm which touches a collar so that the sleeve may be moved in any direction. At the same time the fork is free to have the sliding component which will naturally be a part of the motion where the arm turns about a pivot and, at the same time, imparts a straight-line motion to another shaft.

THE GEAR PUMP—In place of the plunger pump with its ball check valves, the gear pump is finding favor with many manufacturers. It is very simple to arrange a satisfactory drive for the gear pump, since it is driven with a rotary instead of a reciprocating action. Instead of the necessity of an eccentric arrangement to produce the straight line or reciprocating motion necessary in a plunger pump, the gear pump can be driven directly from the camshaft or other rotating part by means of simple gearing.

The pump is shown in Figs. 3 and 4, which illustrate the exterior and a section through the dotted line shown on this cut. The oil enters through the port marked "suction" in the sectional view, and is taken around by the wheels to the delivery side; the oil cannot pass between the teeth in the quantity that it is drawn in by the suction, so it is squeezed out through the delivery port.

With the method of delivery employed in this type of pump it is evident that a large head could not be overcome, as would be the case if the oil were to be lifted to any great height. For the requirements of an oil pump, however, the method is very satisfactory for all cases, as the pressure required does not as a rule amount to more than three or four pounds where the force-feed system is used.

If the rotary gear pump is driven off the camshaft by means of a gear and straight shaft, it is a very desirable feature to insert a spring connection in the shaft so that, should the pump jam, the spring release will work and allow the pump to remain at rest without any of the parts having been broken. This is effected by putting in a spring which will be strong enough to hold the shaft while turning, but which will, in case the pump should jam, break or in some cases slip, so that it is no longer a means of rigid connection, but allows the upper part of the shaft to turn freely.

Where the gear pump is used it is very customary to fit a by-pass as a means of regulating the quantity of oil delivered to the various bearings. The by-pass is so constructed that by turning a lever a greater or less amount of oil may be allowed to pass through it; but when all the oil that can possibly be directed through the by-pass is allowed to flow through this outlet, there will still be a sufficient quantity passing through the oil leads to lubricate the bearings at slow speed. This is done as a matter of precaution so that all the oil will never be accidentally shut off from the engine while the latter is running.

The pressure on the gauge, where such is fitted, in conjunction with this type of pump should be allowed to register a little more with a new car than with one which has been run long enough for the bearings to have worn themselves to a good running fit. The pressure required in city driving will be about a pound less than for the country, as an average. Very often the overflow from the bearings lubricated by the force-feed system forms the basis of an auxiliary splash system.

TREMBLER POINTS OUT OF LINE—It will sometimes happen that the contact points on the magneto timer are not properly in line, and unequal wear will result which will greatly hinder the delicacy of adjustment which is such a necessary feature in this part of the coil. In the accompanying illustration, Fig. 2, C is the primary core, T the trembler, P and P_1 the contact points, N and N_1 the lock nuts and S the set or adjusting screw. The trembler is held at the post H. In a case of this nature a small piece of metal should be brazed on the trembler and then filed square so that when vibrating there will be equal wear on all parts of both contact points.

The adjustments on the set screw S should be made so that when the circuit is closed a continuous droning hum will be given forth by the vibrator. A rattling sound is an indication that the vibrator is working too slowly against the spring. If the latter is the case the tension on the spring should be relaxed by loosening the adjusting screw. When the proper adjustment is made as regards the contact points and the spring tension the lock nuts are tightened into position so as to secure a

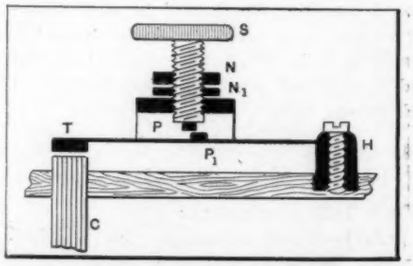


Fig. 2—Illustrating a case where the trembler contact points were out of line

permanent adjustment. The lock nuts are very necessary here, as the continual vibration would soon loosen the set screw if there were no method of securing it in place.

SHORT CIRCUITS—A spark, in leaping the gap between the two sparking points of the spark plug, overcomes a large resistance even if the operation takes place in the open air; but when the air is charged with hydrocarbonic gas this resistance is increased. A slightly compressed charge of gasoline and air may be fired by a spark which would be too weak to fire a charge which has been compressed to the 70 pounds per square inch pressure which

is the general rule in automobile engine practice. It is therefore evident that the resistance is higher in the compression space of the motor than it is in the open air, so that an apparently good spark may not be a spark at all after it is enclosed within the cylinder. This loss of the spark when acting through the compressed medium is due to a short circuit which is caused by the fact that the current, seeking the path of least resistance, finds a way of passing into the ground without crossing the spark gap. The insulation might not leak at all under atmospheric conditions, but just below the pressure at which the spark crosses the gap the current finds a spot in the insulation which offers less resistance than that encountered at the sparking points.

If this leak takes place in the coil it will generally be beyond the scope of the amateur to make his own repairs. A new coil will have to be bought if the damage has gone far, as the internal spark will burn out the surrounding insulation in a very short time. If the leak is at the spark plug, as is very often the case, owing to a cracked porcelain or defective mica insulation, a new plug will quickly eradicate the difficulty. Defective insulation is apt to cause a short circuit at any place along the line. This is especially the case in high-tension wiring, which should be carefully watched, as a little dampness or chafing against moving parts of the motor may be responsible for the damage.

A fault which occurs with dry batteries at times, if they are not carefully packed, is that they are likely to rub together owing to the vibration of the car and thus wear the cardboard boxes which hold them and

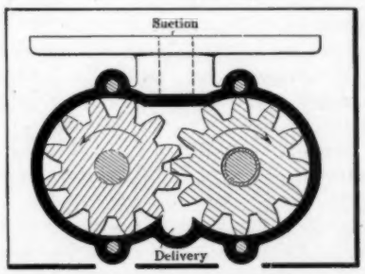


Fig. 3—Section through gear pump at dotted line shown in exterior view

allow the zincs to come in contact with each other. This, of course, does not happen very often, as the batteries as a rule are held in a tight box, which does not permit any chafing action to take place between them.

KEEP BREATHER PIPES CLEAR—As the piston descends, the air beneath it is compressed and hence offers a resistance to the motion of the engine. In order to reduce this resistance breather pipes are fitted on the motor to allow of a free passage of the air in either direction. The air will flow in and out of the crankcase according as it is sucked in by the ascending piston or blown out by the descending. When the breather pipes become choked, resistance is offered to the free passage of the air and hence work will have to be done by the motor in overcoming this resistance. This work is a direct loss since it is put into something which is not necessary and is no factor in driving the car.

The breather pipes are generally fitted with a strainer to keep dirt from entering the crankcase. Very often the strainers fulfill the double duty of keeping the crankcase clean and straining the oil which is put into the crankcase, as the oil is often supplied by this means where the splash system is used. A periodic cleaning of this part would add to the efficiency of the engine.

FIRING AT CORRECT TIME—Next to having the cylinders all firing at the same relative piston position, the greatest item of importance in the motor is to have the charges ignited at the proper time, or when the piston is at the point most suitable for developing the greatest power.

The ideal position for the maximum explosive effect would be at top dead center; but since the internal combustion engine revolves so rapidly, this is a condition which can never obtain even in the best designed engines. When the gas is first ignited, it rapidly expands owing to the heat of its own combustion. The flame is taken up by the surrounding particles of gas and is passed through the whole charge. This takes place very rapidly, but not rapidly enough to obtain the expansion at constant volume which would be the ideal state of affairs. Besides the lag in the explosion there is an appreciable lag in the passage of the electric current through the secondary winding, and therefore when the engine is traveling at high piston speeds the spark lever will have to be advanced a certain amount on the quadrant to allow for this lag. The sooner the charge is ignited, the sooner the maximum pressure will be developed in relation to the stroke and hence the greater the power that will be produced by the motor.

The condition of the mixture and the intensity of the spark are very large factors in determining the proper and most effective firing point. In driving the car the proper position of the spark lever will vary with the conditions under which the car is working, and it is largely a matter of experience on the part of the driver to have the spark in the proper position to obtain all the power of which the motor is capable. As a general rule the greatest power is obtained with the greatest spark advance possible, without having the slightest sign of a knock. In special cases, as in hill climbing or in starting the motor, where the engine turns over very slowly, the spark is retarded, as a back-fire in either of these cases would have bad results. In cranking the machine if the spark has not been sufficiently retarded a serious accident may occur that would result in a broken or severely strained arm. Cases have been known where death was caused by this same occurrence. In the case of a hill, if the charge should be ignited too soon the power would be expended on the piston at the wrong time and hence would be apt to stop the engine.

When firing too late the exhaust pressure is far above what it should be; and since the temperature of the gases depends directly on the pressure, they are also far too hot. This heats the cooling water of the engine to such an extent that it frequently boils, escaping in the form of steam from the radiator cap and other points where such leakage is possible. Besides the overheating there is a loss of power in running the engine with the spark too late, as the high terminal pressure reduces the mean effective pressure and hence the horsepower produced by the motor.

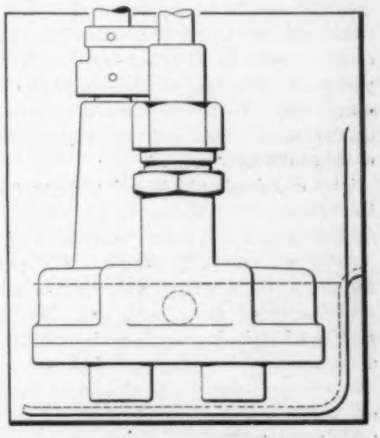


Fig. 4—Exterior of gear pump often used in connection with force-feed oiling

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WORN AND LOOSE GEARS—Where gears have been allowed to wear it is very often the case that they are not in the same relative position with each other that they were when the parts were first assembled. An instance of this kind may be taken in the case of a camshaft whose driving pinions have become so badly worn that in revolving the camshaft lags far behind the position taken when the machine was new. The same may be said of a gear which is loose or a cam which has worked loose and hence is in a different relative position from that formerly occupied.

Where the gears have worn to any extent the action, instead of being smooth and unbroken, may proceed in a series of jerks. This will result in a rattling noise which will readily make itself heard above the sounds given forth by a smooth-running car. The timing of the operation which depends upon such worn or loose parts is very sure to be incorrect. In the case of a camshaft the opening and closing would both be late.

My 1912 Automobile

Some Conceptions of What the Ideal Car Should Be

Illustrates His Ideal

EDITOR THE AUTOMOBILE:

The "1912" automobile should be about 40-50 horsepower, having an en bloc T-head motor with a 4 1-2-inch bore and 6-inch stroke. All valves should be enclosed with dust-proof covers. Magneto, oil pump and water pump should be mounted on a cross shaft at the front. The fan should be bevel gear driven, thus doing away with all possible belt troubles. Ignition should be by means of high-tension magneto and storage battery. Lubrication should be of splash type with an oil pump to raise the oil to the top of the crankcase. An ample sized float-feed carbureter with an air and gas adjustment on dash would be required.

The clutch should be of the contracting band type, thus doing away with thrust against motor and other bearings, and permitting of easy adjustment. The gearset should be of the type where gears are always in mesh, thus doing away with possibility of stripping gears and permitting of a comparatively noiseless shift of gears. The transmission shafts should be mounted on roller bearings, and case to be cast with arms to bolt to rear arms of motor, thus making a unit power plant. Drive should be by shaft with two universal joints.

The wheelbase should be about 120 inches, allowing ample leg room and giving easy riding effect. The springs should be semi-elliptic front 42 x 2 1-2 inches and three-quarter elliptic rear 44 x 2 1-2 inches. The tires should be 36 x 4 inches front and rear, Q. D., on demountable rims.

The front axle should be of drop-forged I-beam type with roller bearings in the wheels, and steering connections above and behind the front axle. The rear axle should be full floating with all roller bearings, and be of a single piece of pressed steel with removable cap to permit of easy access to the differential and bearings.

The control should be by means of an 18-inch steering wheel and adjustable worm and sector. The gear shift to be operated by a lever at right side in H quadrant. The pedal arrangement is standard. Spark and gas operated on top of wheel and foot accelerator. The emergency brake to be worked by side hand lever which releases the clutch when applied, thus lessening wear on transmission shafts.

The body should be fitted with seats having high backs and low bottoms and long leg room provided for, thus making touring more comfortable. (Other details can best be seen from the accompanying drawings.)

The car should be equipped with full set of electric lamps and lighting system, electric signal, top, windshield, shock absorbers, spare rim, tools and other minor conveniences.

This car, weighing probably not more than 2,500 pounds, and with first-class materials used throughout, should cost about $2,500 f.o.b. the factory.

Passaic, N. J. JOSEPH A. LANGE.

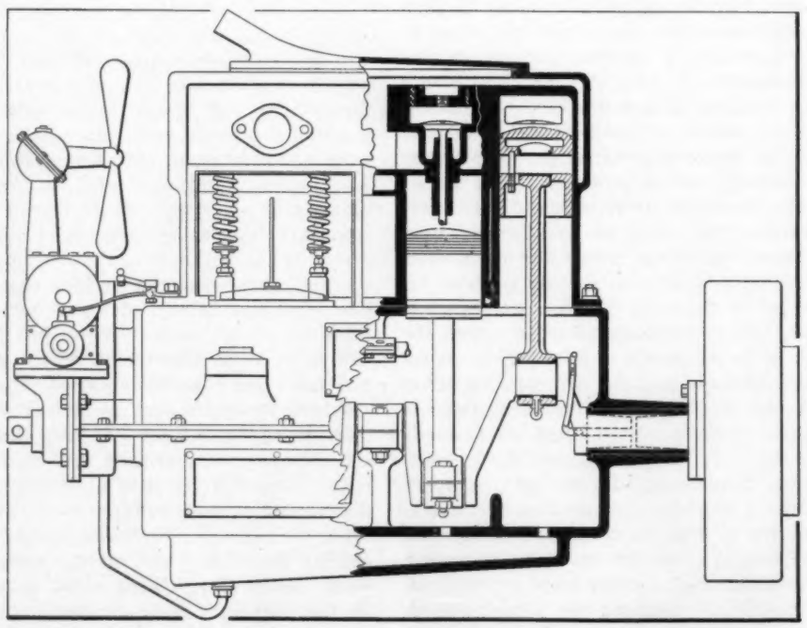

Fig. 1—View of motor as drawn by an "Automobile" reader in illustrating his ideal car

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Working Parts Enclosed

Editor THE AUTOMOBILE:

The following is my ideal for a 1912 machine:

The motor should have four cylinders with 4 1-2-inch bore by 5 1-4-inch stroke giving a conservative rating of 32 horsepower. The cylinders should be cast en bloc with valves in the head operated by a single overhead camshaft driven by means of a silent chain from the crankshaft. The ignition should consist of high-tension magneto and storage battery, each system being entirely separate. The lubrication should be of the force feed type through hollow crankshaft. The crankshaft could be carried on two large ball bearings.

All working parts of the motor should be enclosed and protected from dirt. A large cap could fit over the valve mechanism and protect it from grit.

The clutch should be of the multiple-disc type and should run in oil. The clutch should be in the same housing as the transmission and should be located amidships.

The transmission should be four-speed selective type, with direct on third, and should be fitted with ball bearings.

The drive should be by shaft, with two universal joints to a full floating rear axle with nickel steel driving shafts. The front axle should be of I-beam section and should have generous steering knuckles. In fact, all the steering parts should be made strong and easily adjustable for wear.

The wheels and differential should run on large ball bearings.

The frame should be underslung and inswept in front. It should be supported by long, flat, semi-elliptical springs both front and rear and the springs should be fitted with shock absorbers.

The tires should be 36 x 4 front and 36 x 4 1-2 rear and mounted on demountable rims. The wheelbase should be 115 inches.

Control should be within easy reach and should be on the right-hand side.

The body should be of the two-passenger torpedo type with gasoline tanks and room for tires on rear deck.

The equipment should consist of top,

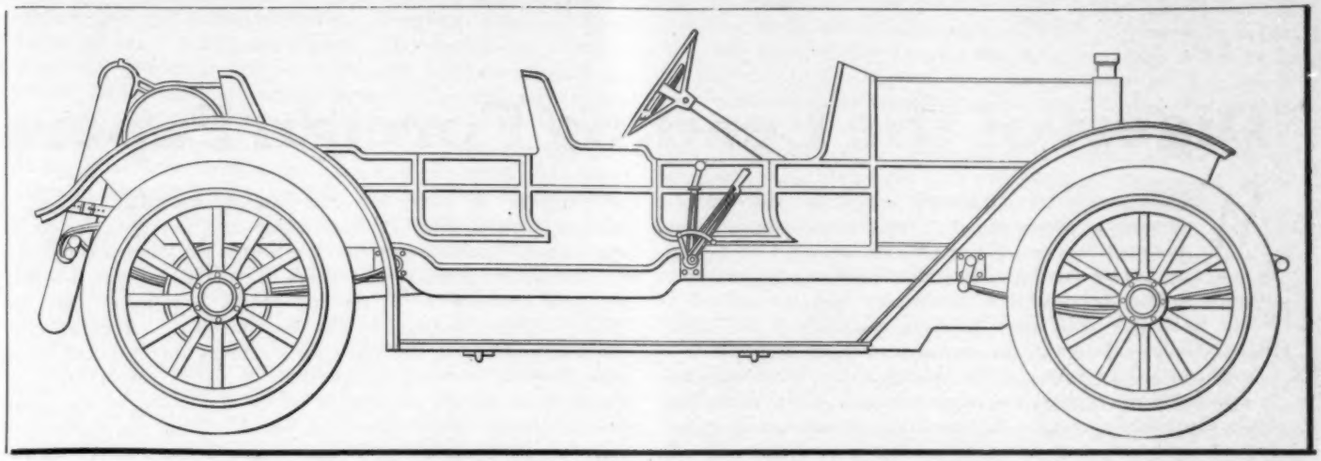

Fig. 2—Type of body suggested by a reader of "The Automobile" in describing his ideal 1912 car

windshield, speedometer, clock, five electric lamps, electric horn, generator and battery for horn and lamps, shock absorbers, and demountable rims with two extra rims.

As this car should be of the very highest grade its price could scarcely be below $3,750.

MARTIN BURKELMAN.

New York City.

Want Five Speeds

Editor THE AUTOMOBILE:

This is, in brief, my conception of the 1912 model car. The motor should have four cylinders cast in pairs with a bore of 90 mm. and a stroke of 180 mm (3 1-2 x 7 1-2 inches) and a nominal horsepower of 20.

The ignition should be by means of high-tension dual magneto system and the lubrication of the force-feed type, the pump being integral with the motor and with no connecting splash. Each part should be oiled separately. The motor should be equipped with either a Zenith or Claudel carbureter and should deliver its power through a leather-faced cone clutch.

The body should be supported upon semi-elliptic springs and I-beam frame members, the rear axle being of the semi-floating type. The wheelbase would be specified as 137 inches. Transmission should give five forward speeds and a reverse.

The motor should be equipped with a self-starter and motor-driven tire pump, while the steering wheel should be fitted with a locking device. A speedometer should also be carried and the brakes controlled by pedal and hand lever.

The body should be a four-passenger type fitted with an external exhaust pipe (without muffler) running along the footboard. Right-hand drive should be fitted, with the levers outside the torpedo body. The hood and body should be in exact alignment, and the door should have the fastening locks inside. The gasoline tank should be located partly under the front seat and partly in the tonneau, furnishing a foot rest for the passengers in the rear compartment. The rear seat foundation should be located directly on the chassis, with tool boxes under the floor of the rear platform of the car, one on each side of the drive shaft. A double extension hood should be fitted with two headlights, two sidelights and a rear lamp—all of the electric type. The glass front should be in two pieces, coming over the steering wheel. Price $2,000.

Here are some reasons for my choice: Long-stroke motors (to my mind it ought to be 1 to 2), are nervous motors; they pick up speed much quicker than the short-stroke type. I own a motor with an 80-millimeter bore and 160-millimeter stroke and it performs extremely well. I consider detachable wire wheels a luxury and believe their worth has been frequently demonstrated. Leather cone clutches are the smoothest for starting in city traffic. The five-speed transmission is a 1911 innovation which has made good in the Boulogne light car races, especially for long-stroke motors. External exhaust pipe (which can be made so as to avoid all noise) would prevent heat invading front of torpedo.

R. DE BEAUDIGUES.

Natoye, Belgium.

THE AVERAGE CAR

The invitation to our subscribers to describe their ideal 1912 car has struck a popular chord. The responses show a wide appreciation of the salient points of car design and a knowledge of the points which tend to reliability and comfort. THE AUTOMOBILE *hereby continues the invitation to its readers to mail in their conception of the features which should be embodied in next year's car. The information given should include such points as:*

Horsepower	*Stroke*	*Drive*	*Front axle*
Cylinder type	*Ignition*	*Springs*	*Control parts*
No. of cylinders	*Lubrication*	*Wheelbase*	*Body features*
Cylinders, how cast	*Clutch*	*Tire sizes*	*Equipment*
Bore	*Gearset*	*Rear Axle*	*Price*

In addition to giving these details the reasons for your points of selection should be stated concisely and clearly.

As a benefit in the matter of comparison some details of the average cars for 1911 are given below.

Each communication must be legibly written on one side of the paper only; it must be properly signed with the writer's full name and address, and if the writer does not wish his own name to appear in print he may request the use of any nom de plume.

Any reader desiring to make line drawings, showing details of his ideas of his car or some of its parts, is requested to do so.

Editor THE AUTOMOBILE.

DETAILS OF AVERAGE 1911 CARS WHICH WILL ENABLE READERS TO MAKE COMPARISONS IN DISCUSSING 1912 MODELS

	$1,000 *and thereabouts*	$1,500 *and thereabouts*	$2,500 *and thereabouts*	$4,000 *and thereabouts*
Horsepower	20.5	29.525	35	43.66
Bore	3.98 *inches*	4.19 *inches*	4.40 *inches*	4.875 *inches*
Stroke	4.12 *inches*	4.64 *inches*	4.98 *inches*	5.39 *inches*
Wheelbase	100 *inches*	114 *inches*	119 *inches*	124 *inches*
Front tires	31.4 x 3.3	33.1 x 3.8	35 x 4	35.7 x 4.27
Rear tires	31.4 x 3.3	33.1 x 3.8	35 x4.1	36.7 x 4.55
Number of cylinders	*Four*	*Four*	*Four*	*Four*
Cylinder type	*L-Head*	*L-Head*	*L-Head*	*T-Head*
Cylinders cast	*Pairs*	*Pairs*	*Pairs*	*Pairs*
Ignition	*Dual*	*Dual*	*Dual*	*Dual*
Clutch	*Disc*	*Multiple disc*	*Cone*	*Multiple disc*

Digest of the Leading Foreign Papers

MOTOR CULTIVATORS, HARROWS AND HOES must pay for themselves during the short season when there is need for their services, but in a large country with a single language the season may be considerable lengthened if the owners of such agricultural machines travel with them from South to North, as is now done with threshing machines in the United States. Under different circumstances it is highly desirable from an economical viewpoint that the motor element in the machines be detachable and applicable to other purposes. Their utility generally depends mostly upon the possibility of performing a great deal of work with them while the weather is favorable and with a minimum of human labor. In the case of beet culture and for other crops where each plant should preferably be isolated, the machines can never do as thorough work in weeding and hoeing as may be done by human hands, as they cannot work so near to the plants, but, as compared with machines drawn by animals, they destroy a great deal less of the desirable growth in passing through a field, and the scarcity of human labor in the country, the world over, has made the mechanical problems involved in the application of the motor principle to this class of work as important as any which are encountered in the automobile industry. Taking this view, a number of local automobile clubs in France in conjunction with several agricultural societies arranged for a competition of motor hoeing machines in the foresummer of 1911 with the co-operation of the syndicate of French sugar manufacturers. The trial took place in a beet field of 11 hectares adjacent to a highway lined with trees, and a heavy rain on the preceding evening had left the soil very wet and slippery, especially under the trees. Nevertheless, the three machines which were entered for the competition performed the work expected of them so nearly satisfactorily that a few changes in their construction should suffice for introducing them broadly in agricultural work. The largest machine in the trial was one made by the Bajac Machine Company, of St. Quentin. It works six rows with a two-cylinder motor of 8 horsepower, weighs 1,400 kilograms and requires two attendants, one who steers the machine from a seat and another who operates the right-angled hoeing irons according to the requirements in the field. For the turns, where every other machine in this class is difficult to manage so that the rows of plants are not injured or the soil upheaved, this machine has a special arrangement whereby the inner wheels turn on metal sheaves which after the turn are again raised and secured to the frame. The field in this case had been prepared with a four-row drilling machine and planter, and the six-row hoeing machine did not fit into this work, but apart from this trouble, which calls attention to the need of standardization in construction, the machine demonstrated its practicability and showed that even the isolating of the plants could be conveniently taken care of.

The second machine was one designed and built by Mrs. de Mesmay, of St. Quentin. It is driven from a single-cylinder motor of 5 to 6 horsepower located above the rear wheels. The front wheels are close together, separated by only a single row of plants. The weight is 900 kilograms and the machine is conducted by one man. The trial showed that the rear wheels of this machine were too narrow, cutting into the soft soil and giving insufficient adhesion where the soil was wet, and, while the operation by one man was considered an important advantage economically, it was observed that the driver could not conveniently regulate the depth at which the hoe blades should work, especially where the surface was uneven. The motor in this machine is, on the other hand, so located that it can be used for all sorts of stationary work on the farm without being dismounted. The third machine was one made by Pruvost-Gandas, of Airennes. It works four rows, weighs 800 kilograms and is equipped with a single-cylinder motor of 5 horsepower. As in the Mesmay machine, one man does all the work but is compelled to turn around in his seat to watch the hoe blades, and this may interfere either with the steering of the machine or with the quality of the weeding. It was the opinion of the judges that the construction of the one-man machines might be modified without great mechanical difficulties so as to enable the conductor to watch the penetration of the hoe blades at the same time as the direction of the front wheels.—From the weekly circular of the Syndicate of French Sugar Manufacturers, as republished in *Allgemeine Automobil Zeitung*, No. 34.

CONTRACTIONS AND EXPANSIONS TAKE PLACE IN ARTICLES MADE OF HARDENED STEEL for several years after the articles have been produced and fitted and independently of the changes due to temperature. In measuring instruments and close-fitting parts the changes are sufficient to cause inaccuracies and troubles, and they point to internal tensions whose relief, when it is brought about through the mere lapse of time, may mean a reduction of strength as well. With regard to measuring instruments two methods have been employed for avoiding inaccuracies due to this cause. One consists in hardening only the ends or exposed parts of the instruments, but opinions have been sharply divided on the efficacy of this method. The other, which is of broader application, consists in keeping the hardened article under a heat of 150 to 200 degrees centrigrade for some length of time, thereby relieving the internal tension, though with a slight sacrifice of hardness. But no rules for such low-heat annealing have ben developed and tested. It was not definitely known if one process of reheating continued for ten hours, for example, was equal to several reheatings of shorter duration but extending over a longer period. A series of experiments were not undertaken at the German government station for the testing of materials. Samples of articles, 10, 25, 50 and 100 millimeters long, were obtained from four different manufacturers (this number responding out of thirty-five firms whose co-operation was solicited) and these were measured at five different times during the period from November, 1906, to December, 1910. The deviations from the normal lengths of the pieces were recorded and tabulated with the use of the Reisenecker measuring machine which allows an expansion of 0.011 millimeter per meter length for each degree centigrade above normal temperature, while the tolerance relating to the accuracy of the measuring operation lies between 0.0002 and 0.003 millimeter. The samples showed remarkable difference. The samples of one firm kept on contracting from time to time, those of another showed mostly expansions; those of a third firm both contractions and expansions. In one case none of the samples gave variations exceeding one-thousandth of a millimeter; in another case the variations ran to five one-thousandths and above. The expansions and contractions were nowise proportionate to the lengths but were reduced where only the ends or exposed parts had been hardened. Many other experiments were conducted with articles made from steels of different composition or which had been subjected to different heat treatment. The upshot of all the experiments, as detailed by the authors, was, however, that in all cases changes in dimensions and shapes could be obviated practically by one reheating at 150 degrees centigrade continued for ten hours. The practice of immersing hardened steel parts in boiling oil for a considerable length of time before regrinding to exact dimensions was thus practically sustained.—A. Leman and A. Werner in *Werkstattstechnik*, August.

ON THE ORGANIZATION OF A CASEHARDENING DEPARTMENT Léon Guillet, the well-known authority, offers the following advice based on his practical experience: The department should be physically divided in two sections, each with its separate personnel, both under one superintendent. The cementation process requires much less precision and ability than the subsequent hardening and, besides, in any factory there are other pieces to be hardened than those which have been cemented. The superintendent should have near him the receiving booth through which all pieces should pass for checking and inspection before treatment. The system of control at this booth forms a separate subject. The cementation department proper should comprise (1) a room for boxing the work, with the necessary tools; (2) adjacent compartments for the manufacture of cementation material, with pestle crusher and reserve stock; for storage of boxes and filler earth; for a little shop to take care of the preparation of sheet metal parts used in the reserve work (copper plating or other means for excluding certain portions of the work from the cementation process) and, in large establishments, for the manufacture of boxes; (3) the furnace room, spacious and ventilated, and (4) a cooling area, which may be a shed, in which the boxes are placed on rails to avoid contact with the ground and moisture. In front of the superintendent's desk, to be consulted by him and by the workman who attends the furnaces, a registering galvanometer should be placed, connected by fixed wires with the pyrometric couple-rod, and, as the latter may be placed in one or the other among the furnaces, there is need of a certain number of wiring posts before the furnaces and before the galvanometer. The latter is also connected with the sight glass which must be movable before the furnace. The wires which connect it with the galvanometer are simply passed along on a cable strung before the battery of furnaces and are not cumbersome in the shop. Datum posts in the ground admit of moving the sight rapidly from one furnace to another. It is well to measure the temperatures every fifteen minutes, and with a battery of six furnaces this operation does not occupy more than five minutes in all, so that the same man can read the temperatures and regulate the furnaces, as is preferable.

In the hardening section the pieces which require no cementation are received direct from the receiving booth at the entrance to the department, but the hardening section should have a separate booth where the foreman of the hardening room under his own responsibility receives the cemented pieces which he is to harden. At this booth there should be found all the calipers and other tools necessary for verifying the pieces which are delivered to him and seeing whether the cementation alone has not caused some defect, especially if the pieces are not scaly or oxidized. Outside of this receiving booth of its own, the hardening section comprises the battery of furnaces which usually will be of different types; a muffle furnace, salt bath furnaces and even furnaces of different dimensions for large, medium and small pieces. As most cemented pieces must be hardened at 1,000 degrees or at 750 degrees, it is useful to have furnaces of these two temperatures to avoid loss of time.

In front of the furnaces there should be found the battery of baths. There can be a series of movable troughs and of fixed basins. The movable ones are intended for small work and for baths which need not be very cold. They should roll on rails. The fixed basins are best sunk into the ground so that their rims are just flush with it and are intended for large pieces and for cooling by forced circulation of water. A hardening shop should have a large water bath, a smaller water bath, an oil bath (the preferred composition of the oil is, two parts of rapeseed oil, two parts of nut oil and one part of olive oil) and one bath more active than oil and less active than water, such as lime water.

To measure temperatures in the baths, thermo-electric couples with indicating or recording galvanometer are preferred. If one wants greater precision, an electric-resistance apparatus may be used, but the recording instrument based on this principle is very delicate and should not be considered an industrial tool.

The hardened pieces should be checked off and returned to a checking bureau situated near the superintendent, where they are recognized as good or bad. In the first case they are passed to the mechanical shops; in the second they are returned to the hardening room, and if suitable treatment continues to give a poor showing at the checking roof, the quality of the original material should be again verified.

With this equipment the cost of work should not be excessive. Night work, however, always gives poor results unless there is a complete double shift of workmen, including two superintendents.—*Le Génie Civil*, July 29.

Calendar of Coming Events

Shows, Meetings, Etc.

Sept. 25-30.....Atlantic City, N. J., Convention and Exhibition of the Carriage Builders' National Association.
Oct. 7-14.....Chicago, Ill., Show of Chicago Automobile Trade Association.
Jan. 1-5, 1912.....New York City, Grand Central Palace, Annual Show, Automobile Manufacturers' Association of America.
Jan. 6-13.....New York City, Madison Square Garden, Twelfth Annual Show, Pleasure Car Division, Automobile Board of Trade.
Jan. 6-20.....New York City, Madison Square Garden, Annual Show, Motor and Accessory Manufacturers.
Jan. 10-17.....New York City, Grand Central Palace, Twelfth Annual Show, National Association of Automobile Manufacturers; also Motor and Accessory Manufacturers.
Jan. 15-20.....New York City, Madison Square Garden, Twelfth Annual Show, Commercial Division, Automobile Board of Trade.
Jan. 18-20.....New York City, Annual Meeting of the Society of Automobile Engineers.
Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show under the auspices of the National Association of Automobile Manufacturers. Pleasure cars, first week. Commercial vehicles, second week. Accessories, both weeks.
March 2-9.....Boston, Mass., Tenth Annual Show, Boston Automobile Dealers' Association, Inc.

Race Meets, Runs, Hill-Climbs, Etc.

Sept. 30.....Guttenberg, N. J., Track Races.
Sept. 30.....Bridgeton, N. J., Track Races, South Jersey Motor Club.
Sept. 30.....Flint, Mich., Track Races.
Oct. 7.....Danbury, Conn., Track Races, Danbury Agric. Soc.
Oct. 7.....Philadelphia, Fairmount Park Road Races, Quaker City Motor Club.
Oct. 7.....Springfield, Ill., Track Races, Springfield Automobile Club.
Oct. 9-13.....Denver, Colo., Reliability Run, Denver Motor Club.
Oct. 10.....Bedford, Ind., Hill Climb.
Oct. 11.....Oklahoma City, Okla., Reliability Run, Oklahoma State Automobile Association.
Oct. 12-13.....Peoria, Ill., Track Races, Peoria National Implement and Vehicle Show.
Oct. 14.....Santa Monica, Cal., Road Races.
Oct. 14 (to 25)....New York City, Start of the Annual Glidden Tour, en route for Jacksonville, Fla.
Oct. 16-18.....Harrisburg, Pa., Reliability Run, Motor Club of Harrisburg.
Oct. 21.....Atlanta, Ga., Track Races.
Oct. 27-Nov. 3.....Chicago, Ill., Thousand-Mile Reliability Run, Chicago Motor Club.
Oct. 31.....Shreveport, La., Track Races, Shreveport Automobile Club.
Nov. 1.....Waco, Tex., Track Races, Waco Auto Club.
Nov. 2-4.....Philadelphia, Reliability Run, Quaker City Motor Club.
Nov. 3-4.....Columbia, S. C., Track Races, Automobile Club of Columbia.
Nov. 4-6.....Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 9.....Phoenix, Ariz., Track Races, Maricopa Automobile Club.
Nov. 9, 10, 12.....San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 27.....Savannah, Ga., Vanderbilt Cup Race, Savannah Automobile Club.
Nov. 30.....Los Angeles, Cal., Track Races, Motordrome.
Nov. 30.....Savannah, Ga., Grand Prize Race, Savannah Automobile Club.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.

Foreign Fixtures

Oct. 1.....Gaillon, France, Hill-Climb.
Oct. 12-22.....Berlin, International Automobile Exhibition.
Nov. 3-11.....London, Eng., Olympia Show.

THE AUTOMOBILE

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The Will and the Way

TWO years ago one maker refused to build fore-door bodies because he did not know how to ventilate them. He said they could not be satisfactorily ventilated and that consequently they would never come into favor. After he saw the error of his ways and realized that he would become a back number if he did not discard some of his old bodies and build fore-door types, he tried to start a criticism against those who advocated the fore-door body on the ground that they were injuring the industry by compelling many makers to build over bodies that were antiquated. This is a deplorable case of being behind the times. When a maker is so slow that he is caught with a line of old-fashioned goods on his hands he should have enough pride to suffer his loss and use every effort to get into the van. A maker who is so busy that he cannot follow the trend of public demand closer than this should take a holiday every week and get out among the public, keep his ears and eyes wide open and find out what is doing. It is just as important to know the public pulse as it is to have a good designer.

But makers of automobiles must get out into the buying world for other reasons than studying the body requirements. They can find out very well just where their cars are weak and what the public thinks of them. In the early days many makers personally went on the long reliability runs, attended the hill-climbs and visited the races with the sole object of studying the performances of their own cars as well as those of other cars. Of late there has been a falling off in this respect. Many makers who have built up reputations on their achievements in contests are now more or less content to rest on their laurels. While they have been resting the young bloods of the industry have been toiling upward in the night. The younger element has adopted the latest designs, and now the older heads are compelled to fall in line. The automobile maker who imagines that his car is perfected, that it will sell in its present form for two, three or perhaps four seasons yet to come, is making an error. He will be rudely wakened some day with a lot of unsold cars on his hands. That maker does not exist to-day who can safely sit down and say, "Our car is perfected; we have nothing to do but manufacture and fill orders." The public is getting wiser every day in the matter of automobiles; and reputation, while it will dispose of the factory output for a season or so, is not enough to bank upon for the future. As one season succeeds another, fresh examples are given of old houses losing their hold. The only rule is to keep everlastingly at it. Keeping to the front to-day demands unity in every department; it demands keeping in touch with the latest constructions in every respect, and it demands following the public sentiment.

* * *

Studying Salesmanship

THESE are the real testing days. A year or so ago the salesman was more or less of an order clerk. He used to busy himself writing out orders. The sales manager was a distribution chief. His big job was to satisfy dealers everywhere that they were getting their correct allotments of cars at the specified times, and that one was not being given an undue lot of automobiles at the expense of some other one. Those days are over. To-day the salesman has to sell cars. Many of the old salesroom decorations are missing. They made good when people bought cars, but could not stand the pace when the rule became one of the salesman selling machines.

But the salesman is not the only selling factor in a salesroom. The salesroom itself is a quantity to be reckoned with. The most successful merchants employ high-paid decorators to display their wares. This display feature of automobile salesmanship has scarcely been scratched. How many salesrooms can you find in which the laws of display have been studied out to the smallest detail? There are a few of such in every big city, but they can generally be counted on the fingers of one hand. Above all, the salesroom should be well lighted, it should be orderly, it should be clean, and the salesmen should be in keeping with the situation. The public of to-day is a critical public; it is accustomed to the finest arts of salesmanship in such fields as insurance, bonds, stocks, real estate, debentures, etc., and when the amateur automobile salesman tries to create an impression it frequently resents it. It does not remonstrate, but simply does not buy.

One of the largest automobile concerns in the country has realized that not only must its salesmen know its own cars, but they must know all about the car of its leading competitor. At one of its conventions a car of its leading rival was purchased and analyzed in every detail. The salesman thus became acquainted with its good qualities as well as with its defects. In this way he became better qualified to meet the arguments of the buyer. Nothing is quite so convincing as an array of facts when it comes to making a sale. The more the salesman knows about the other car, the more confidence he has in himself, the more convincing are his statements, and the more weight they have with the buyer. Knowledge is not the only essential, but it is a big factor. In addition to knowledge the salesman must know how to address people; he must have ability in studying his buyer; he must know the logic of arguments; he must have address, and must know his car thoroughly.

Knight a Guest of His Associates

CHARLES Y. KNIGHT, inventor of the Knight sleeve-valve motor, was the guest of honor at a dinner given Monday night at the New York Athletic Club. There were about 100 present, including representatives of the four licensees in the United States under the Knight patent and a representative gathering of automobile officials. Mr. Knight arrived in New York on the *Campania* last Saturday and will remain in this country only a short time. He is booked up for a number of addresses and lectures in various parts of the country and his itinerary as marked out so far will extend to Pittsburgh and Cleveland and may extent still further west.

During the speeches that followed the elaborate dinner the hitherto unwritten history of the invention was outlined by Mr. Knight and Messrs. Lonas and Kilbourne, who were associated with the inventor in developing the device and placing it upon the market.

Mr. Knight told the story of his life in simple, direct fashion. He said he was born in Indiana and entered the battle for a living as a printer. He progressed through the whole range of the craft and at the end of 25 years was editor of a weekly produce paper in Chicago. During his service in the publishing line he invented a newspaper printing press and a wrapping device, neither of which gained him much fame, and he experienced two rather discouraging collisions with competitors who infringed patent rights he thought he was entitled to.

At the time of the commencement of the vogue of the automobile Mr. Knight became interested in the new art and purchased one of the earliest examples of the industry that was shipped to Chicago.

In the fall of 1907, having gained the ear of the Daimler Company, in England, the motor was accepted by that concern and within the next year was placed with representative concerns in other European countries.

With regard to its introduction in the United States, Mr. Knight recounted his experience with four prominent automobile manufacturers. He said he had arranged for licensing the four, when a reissued patent covering steam engines was injected into the situation and two of the companies, having gained certain interests in the reissued patent, which Mr. Knight said was written with a model of his engine as its foundation, declined to proceed under the license and threatened Mr. Knight with action in infringement if he attempted to manufacture his own engine in the United States.

Charles Y. Knight, inventor of the Knight sleeve-valve motor

This proved effective in stopping the disaffected pair of manufacturing concerns from taking up the device at the time and served as a check upon the activities of the Knight motor in America until this year.

Mr. Knight said that Mr. Kilbourne, his partner and financial backer, had spent $150,000 before there was any substantial return from the business.

Mr. Lonas acted as the attorney for Mr. Knight during his early struggles and was instrumental in paving the way for the first real trial of the motor at the hands of the Daimler company.

One of the most interesting

Charles Y. Knight was honored by his associates at a banquet held at the New York Athletic Club on Monday evening, Sept. 26

features of the speaking was the attitude assumed by the American licensees. Horace De Lisser, vice-president of the United States Motor Company, said that about 40 per cent. of the number of cars authorized under the licenses granted to the Columbia and Stoddard-Dayton companies had been contracted for and the Columbia company desired to make 100 per cent. more than its allotted number and the Stoddard-Dayton, 75 per cent. more, for 1912 business.

C. E. Hadley, production manager of the Knight engine department of the Stearns company, said that the engine after a series of exhaustive tests had proven satisfactory and that 40 cars had been finished.

Mr. De Lisser created something of a sensation when he spoke of the part that is to be played in the making of Knight engines in the United States by the Atlas Engine Works, of Indianapolis. He said that, while he had no doubt as to the quality of work to be turned out by the engine company, he wished to warn Mr. Knight that there is real danger to be feared if the engines so made should get into the hands of automobile manufacturers who do not realize that there is anything else in an automobile beside the engine.

He said that, in such an event, it might reflect upon the licensees who manufactured their own Knight engines.

Replying broadly to Mr. De Lisser, H. J. Halle, treasurer of the Atlas Engine Works, assured the licensees that their interests would be jealously guarded by his company and that every precaution would be taken to prevent the engines made by his concern from getting into undeserving hands.

He explained that the Atlas Engine Works had secured the fourth American license from Mr. Knight and that the company would make all the Knight engines in the United States that were not made by the other licensees. He broadly intimated that the activities of his company might not be permanently limited to such work, but that, if in the future the licensees wished the Atlas company to make their engines, the company would undertake to supply the whole licensed automobile trade in the United States.

Other speakers were: J. G. Sterling, of the Stearns engineering department, Frederick E. Dayton, of the Columbia, and others. J. E. G. Ryan acted as toastmaster. Those present included the following:

Charles Y. Knight, L. B. Kilbourne, Frank E. Lonas, H. W. Nuckols, Horace De Lisser, Alfred Reeves, Henry Sanderson, F. H. Baker, H. H. Hower, W. A. Lesser, C. E. Hadley, J. G. Sterling, E. G. Moore, Andre Massanet, E. Lilly, James M. Carples, Coker F. Clarkson and many others.

Knight Explains His Engine

In the presence of a gathering numbering close to 400 automobile experts, Charles Y. Knight explained in exhaustive style the operation of the Knight Sleeve-Valve Motor at the Automobile Club of America, Tuesday evening.

For over an hour the assembly listened with profound attention to the inventor's address and at the end, the speaker was questioned on a number of points and devoted another hour to answering the queries.

Mr. Knight was introduced by Emerson Brooks. He began his address by outlining the preliminaries that led up to the adoption of the motor by several foreign companies and its introduction into the United States, laying particular stress upon the action of the Atlas Engine Works, which he said had abandoned the making of steam engines, after 50 years of successful operation along that line, to take up the manufacture of the Knight engine.

He said that the conclusions to be drawn from this action are that this company believes that the reciprocating engine of the future will be of the internal combustion type and that the ultimate internal combustion motor will not be of the poppet-valve variety.

In describing the present state of the art insofar as internal combustion engines are concerned, Mr. Knight said that the field is divided into two parts; one the poppet-valve school and the other the four-cycle sleeve-valve motor. He minimized the importance of the two-cycle engine for automobiles, saying that that principle had been employed with success in one instance, but that the public was not enthusiastic. He stated that public taste was difficult to follow, but that it was a most important influence.

In emphasizing the effect that the introduction of the sleeve type has had upon the art he said that at least 250 patents have been issued abroad covering suggestions for improvement of the sleeve-valve engine, none of which varies materially from the Knight device.

In telling of the salient features of his invention, Mr. Knight said:

"The outstanding feature is the substitution of sleeve valves for poppet valves, which idea I believe was wholly original with myself. Other forms of valves than mine, instead of contributing to further efficiency of the motor, are employed in spite of their disadvantages.

"The ports in the inner sleeve are sealed in operation through the lapping of their openings with a wide ring, called the junk ring. This ring is similar in construction to the ordinary piston ring, only wider in order to seal the ports. Under the junk ring is placed a second to insure perfect contact with the interior of the sleeve. Above them are two or three ordinary piston rings to bar the escape of gases which might pass the break in the junk ring.

"At the time of explosion the ports in the inner sleeve are central with a wide junk ring. Hence at the time of the development of the greatest heat, the ports are not exposed to heat at all and therefore the lips and the section of the sleeve carrying them are cooled after every explosion, being pushed up and rubbed against a water-cooled surface."

Mr. Knight pointed out that in the case of poppet valves, the heads are always subjected to the highest temperature generated in the explosion chamber, which he said at the maximum was approximately the melting point of steel.

He then described in much detail the system of lubrication used, dealing with the difficulties encountered in this phase of the operation of all motors and stating that in the Knight engine the problem had been solved in a satisfactory manner. He brought out the fact that only on the compression stroke was their heavy pressure on the sleeves and that in consequence of the relaxed pressure on the other three strokes, the flow of oil over the lubricated surfaces of the sleeves and cylinder was comparatively easy to accomplish. This he said was by splash at the bottom and by capillary attraction at the top.

The clearance between the sleeves, he said, may be as great as that between the piston and the cylinder walls.

Referring to the subject of wear in the sleeves, Mr. Knight said that it was inappreciable and that in motors that had traveled 100,000 miles no evidence of wear was to be found after the first few hundred miles. He said that he was confident that they would not deteriorate from the use represented by 1,000,000 miles on the road.

He made a special point about the accessibility of the sleeves for cleaning or the removal of carbon deposits. The power lost in driving the eccentrics which actuate the sleeves, he said, he found to be about 2 horsepower in a motor developing 77 horsepower and using a dozen 5-inch sleeves and reckoned that the proportion of loss as compared with poppet-valve engines of similar size would be about 160 to 250, or in other words, 50 per cent. greater than it was in the sleeve type.

He then recounted the tests to which his engine had been subjected, going into the subject in much detail.

Mr. Knight used a huge working model of a sectional cylinder, showing the piston and sleeve action, eccentrics and shaft and the functioning of the ports.

The questions asked at the conclusion of his address did not bring out anything radical or particularly interesting.

S. A. E. Tour Abroad

PROSPECTS are good for the size and success of the trip the members of the Society of Automobile Engineers will take abroad during November, to view the Automobile Show at Olympia, London, and leading automobile factories in England and France, and to participate in meetings with the Incorporated Institution of Automobile Engineers. November 11 the British Society of Automobile Engineers will give the S. A. E. visiting members a dinner, and November 8 there will be a joint technical meeting, at which a member of the society will present a paper.

In addition to events previously announced, visits will probably be made to the South Kensington Museum in London, the testing laboratories of the Royal Automobile Club of England and of the Automobile Club of France, the Conservatoire des Arts et Métiers, and the Clement and DeDion plants in France. Factories making commercial vehicles as well as pleasure cars will be visited; also those having moderate-priced as well as highest-priced product.

The party will probably sail on a steamer leaving New York November 1, and the program outlined will take up practically the whole month of November, including the return journey home.

The following have signified their intention of making the trip; many of them will be accompanied by their wives: Henry Souther, president of the society; Howard E. Coffin, past president of the society; D. G. McDiarmid, superintendent and designer, C. P. Kimball & Co., Chicago; William E. Metzger, secretary and treasurer, Metzger Motor Car Co.; William Kelley, vice-president and engineer, Metzger Motor Car Co.; J. G. Vincent, chief engineer, Hudson Motor Car Co.; A. R. Miller, Bartal, Daly & Miller; John S. Clarke, vice-president, Autocar Co.; B. B. Bachman, engineer, The Autocar Co.; David S. Ludlum, president, Autocar Co.; G. R. Wadsworth, assistant to president, Peerless Motor Car Co.; A. J. Myers, engineer, G. & A. Carbureter Co.; G. B. Von Rottweiler, manager and chief engineer, Falls Machine Co.; H. L. Davisson, engineer, Edison Storage Battery Co.; L. C. Marburg, secretary and treasurer, Marburg Bros.; Coker F. Clarkson, secretary, Society of Automobile Engineers.

Quite a number of additional members will join the party if they can make the necessary arrangements.

Membership in the Society of Automobile Engineers is still growing steadily and rapidly, the present figures for all classes being 934, of which about 700 constitute the full active roster. The growth of the S. A. E. has been phenomenal. Less than 18 months ago it had no more than 300 members on its membership rolls.

This growth is particularly accountable to three factors: First, the absorption of the mechanical branch of the A. L. A. M., which nearly doubled its membership; second, the rapid growth of the automobile industry; third, the active, useful work of the society itself.

The field from which it has drawn its members is limited, but the scope from which it may rightfully draw them is constantly increasing. There are probably 1000 fully qualified engineers employed by the manufacturers of cars. There are at least another 1000 employed by manufacturers of automobile accessories and quite as many independent engineers of high attainments who act in a consulting capacity for both car and accessory makers.

In addition to these men, all of whom possess a highly technical training, there are many thousands of corporation officers, students of mechanics and men of practical knowledge connected with the industry who are eligible to consideration in the limited grades of the S. A. E. Naturally enough the society is thriving from a membership point of view, just as the industry it represents is growing in importance, not only as a factor in the progress of the day, but also as a potent force in the general advancement of civilization.

Gossip of Coming Shows

DURING the past week slow progress has been made with reference to the two big automobile shows to be held in January. With regard to the space allotments at Madison Square Garden during the exhibit of pleasure cars, the probabilities are that there will be only a few minor changes, but in the truck section the Automobile Board of Trade is in a quandary.

The management is endeavoring to locate the various exhibits approximately as they were staged last year but owing to the pronounced tendency of many of the companies to make larger trucks than before the problem of housing exhibits above the main floor is proving a puzzle.

The difficulty lies in the inability of the elevators to handle the largest types of trucks. Thus, where a concern that formerly showed small cars in the gallery, and this year wishes to display big ones, something will have to be done to make it possible.

The National show, scheduled for the Palace, is making good progress. Already contracts have been made to display the Regal, Waverley, Imperial, Stutz, Abbott, Cole, Crow, Firestone-Columbus, Elkhart, Colby, Great Western and Rambler among the pleasure automobiles and the Sanford-Herbert, Cortland, Federal, Lippard-Stewart and Universal, among the commercials. In addition to these, contracts have been practically closed with the Kissel, Schacht, Lion, Hupmobile, Clark-Carter, Paige-Detroit, and the Hupp Corporation. There will be a fine exhibit of electrics including Baker, Babcock, Rauch & Lang and Detroit.

It is announced that fully forty makes of pleasure cars are likely to be shown and probably twenty different types of trucks.

Straightening Out Halladay Tangle

CHICAGO, ILL., Sept. 26—Last Saturday a petition in voluntary bankruptcy was filed by the Streator Motor Car Company, of Streator, Ill., and also John C. Barlow and Paul Chubbuck, the principal owners of the company. About 2 hours later one of the creditors of the company presented a petition for the appointment of a receiver and the Central Trust Company was appointed by Judge Landis.

Yesterday the Streator Motor Car Company, in a petition, joined in by its principal creditors, asked that the order appointed by the receivers be vacated, and the matter was continued until to-day. Judge Landis, after hearing the case, decided to remove the receiver.

It developed during the hearing to-day that the Streator Motor Car Company had been doing a large business on a small capital and was very hard pressed. Mr. Barlow and Mr. Chubbuck, its chief stockholders, owned large real estate holdings in and around Streator but could not quickly realize on the property, so as to assist the company.

In this condition they approached the larger creditors of the motor company with a proposition to bond their real estate holdings for $425,000 and give the bonds to the creditors of the company in payment of its debts, this putting the company on its feet financially. About 80 per cent. of the creditors in number and amount accepted, but a small minority was trying to block the proposed settlement and the result was the filing of the petitions in bankruptcy.

It was the first case presented in this jurisdiction under the amendment of the bankruptcy act in 1910. The petitioners did not ask to be adjudged bankrupt, but simply that a meeting of their creditors be called to prove up their claims and that at such meeting, they proposed to submit to the creditors the proposition of accepting the bonds in payment of their claims against the motor company, under the amendment referred to.

It is understood that a meeting of the creditors will be called in about 10 days. While no formal statement has been made, it is claimed that the Streator Motor Car Company has assets of about $750,000 and owes some $300,000. The proposed plan will put the company entirely out of debt. In the meantime it will operate as heretofore.

Flathead Motor Club celebrates completion of a section of the Glacier Park-Yellowstone Park road with a delightful tour

Montana Building Inter-Park Road

KALISPELL, MONT., Sept. 22—Good roads do not necessarily follow in the path of settlement and territorial development, but may be the forerunner of the upbuilding and populating of a hitherto inactive area. This has been demonstrated by Flathead County, Montana, which, a few days ago, celebrated the opening of a 30-mile automobile boulevard where a few months ago had been only a rough Indian trail through the forest. This road, when completed, is destined to bind Yellowstone Park and the Glacier National Park, 300 miles apart as the crow flies.

In honor of the opening of Flathead County's section of the road a band of motorists from Kalispell, Mont., with 50 cars in line, toured from their town to the Glacier National Park for inspection of the new highway.

The start was made under the cloudless skies of a perfect September day, with just a tang of approaching autumn in the air. The run was planned by the Flathead Motor Club to celebrate the completion of the road across that county.

M. W. Bottorf, in a 48-horsepower Franklin, was pacemaker. Falling in behind him the automobiles wound through a valley road to Columbia Falls, and a few miles out of town many had their first introduction to the great improvement made within the past year. Stumps had been removed, curves cut out and the roadbed graded and rolled.

From Columbia Falls the way led across a bridge over the Flathead River, and at the top of the hill the cars stopped in a long line which extended back through the valley between tall and stately pines.

Through picturesque Red Rock Canyon, with the blue Flathead River at the left and at the right a precipitous mountain, where a couple of years ago the old passage was by foot or horseback, the procession wound round on a shelf cut out of the mountain side. It was nearly all new country, except as it had been seen from passing railway trains. The trees stand thick and straight on either side, 100 feet high, and in places the road is a great gash through the forest.

The transformed "tote road" led on, with varying scenery, to Lake Belton, where some of the travelers stopped for lunch, the others traveling three miles farther to Lake McDonald.

The building of this highway may be an important argument for the admission of automobiles to Yellowstone Park, where they are now forbidden by the Government.

The building of the Flathead County part of the road was considerably criticized by those who failed to see the object in building a road through a rough forest country. Other sentiments, however, prevailed and the construction was pushed rapidly forward with the result that Flathead County, Montana, is now a much-talked-of section of the Northwest, while it has, by this highway, opened its towns and its territory to the travel of motorists of the whole United States.

Good Roads Convention November 20-23

RICHMOND, VA., Sept. 25—The National Good Roads Convention which will be held in this city on November 20-23 and which President Taft has given assurance he will attend, will be extensively advertised throughout all the States through the Washington office of the association.

The most important matter to be taken up at the convention will be the construction of the national highway between Richmond and Washington as a memorial to President Lincoln at a cost of $2,000,000.

Various plans for the "capitol to capitol" route have been suggested. Charles P. Light, chief field representative, is in Richmond making the final preparations for the national convention.

Government Instructs in Road Examination

WASHINGTON, D. C., Sept. 25—Dust prevention and road preservation are almost inseparable subjects in the study of good roads, so insistently demanding the attention of road engineers

and chemists interested in modern road construction. The bulletin just issued by the Office of Public Roads, Department of Agriculture, on methods for the examination of bituminous road materials, containing complete descriptions of the methods of examination for that class of materials, as employed at present by that branch of the Government service, will undoubtedly materially further the adoption of standard methods, a matter of the utmost importance at this time, different methods frequently obtaining in the same State.

These methods are presented in such a form that any intelligent person may, with a little practice and the proper equipment, make such examination. It is to be regretted that no standard methods for examining bituminous road materials have been generally adopted, as the necessity for such standards has become imperative. The Office of Public Roads has given considerable attention to the matter.

Maryland Seeks to Amend License Law

BALTIMORE, MD., Sept. 25—A resolution was introduced into the City Council by Councilman Garland which directed that the joint special committee on legislation of the two branches of the Council during the next session of the Maryland Legislature be empowered to draft amendments to the motor vehicle law regarding the issuing of licenses.

These proposed amendments call for the appointment of a reliable board of examiners to whom all applicants for licenses to operate motor cars shall submit their claims and qualifications.

Councilman Garland's aim is to have licenses withheld from all persons except those who, in addition to possessing the proper skill, are sufficiently cautious in their habits and not a menace to the general public. Furthermore, Mr. Garland desires to have a provision inserted making it punishable for any one to operate a motor car unless he is an actual licensee in his own name; also that the city of Baltimore shall receive a volume of revenue from automobile licenses in exact proportion to the number of automobile licenses granted to residents of the city.

Service Cars at Municipal Congress

CHICAGO, Sept. 25—Motor cars are in evidence in the Coliseum this week during the International municipal congress and exposition now in progress here. More than half of the public service vehicles on display are motor driven. Among the exhibitors are the Briggs Labor Saving Specialty Co., the Kelly-Springfield Road Roller Co. and several makers of motor fire-fighting equipment.

Good Roads, Keynote of Prosperity

(*Continued from page 519.*)

The cost of some of the best present work runs as high as $16,000 a mile and the average of first-class road making is probably in the neighborhood of $10,000. If general highway construction all over the country were to reach such figures the total expenditure would be considered prohibitive. But while general improvement on any such basis is still a long way in the future, it will arrive one day and the United States will wonder why there ever should have been a doubt about the wisdom of a permanent investment of ten billions of dollars in country highways.

It will not come in any one year and will not be completed in any one decade; thus the expenditure will be spread over many years and the returns will be so quick to follow investment in any locality that the stupendous amount of money involved will not prove burdensome. The investment of vast sums of money in road improvements will not serve to divert the wealth of the country from the ordinary channels of trade, for, while the highway bonds will undoubtedly attract conservative investors, the proceeds of the bonds will be spent for labor and material and in the course of ordinary business will be immediately drawn back into the commercial veins and distributed to the arteries of the business body.

There is no chance to overstate the importance of good roads. There never was a safer and better investment for the taxpayers of any township, county or State than the fully justified reputation for having excellent highways. It means more trade and better trade; more health and human enjoyment; more social pleasure and business facility. It means in a word, to the general citizenship, a life worth living.

Maxwell Scores in Lu Lu's Run

PHILADELPHIA, Sept. 25—Eighty-six contestants appeared for the first social run of the Lu Lu Temple Automobile Club from Philadelphia to Atlantic City last Saturday, making one of the largest organized tours ever held in the East.

Four prizes were awarded to the contestants who arrived in Atlantic City nearest to the secret time schedule set by Potentates W. Freeland Kendrick and Harry Evans. The winner proved to be a new Maxwell Special entered and driven by William A. Walton. A Maxwell Messenger 16-horsepower runabout, driven by A. A. Jones, won fourth place. At the end of the run an automobile show was held on the Million Dollar Pier which was attended by thousands.

A great gash cut in the primeval forest to accommodate the road from Glacier National Park to Yellowstone Park.

Late News from the Contest World

HARTFORD, CONN., Sept. 29—A bursting tire robbed Ralph DePalma's Simplex of an opportunity to snatch the 15-mile circular track record at Charter Oak Park yesterday afternoon. Taking the turn at the eighth-mile post at a mile-a-minute gait, the tire burst and the car skidded to within a foot of the fence.

The trial was the climax of the race meet held under the direction of the Automobile Club of Hartford before a crowd of 5,000 people. The DePalma-Simplex combination was the chief attraction. He went after the one-mile record and failed, covering the distance in 52 1-5 seconds, the record being 51 3-5 seconds. Later he went after the Charter Oak Park record for five miles and succeeded, his time being 4 minutes and 23 seconds, 1 2-5 seconds faster than the record.

There was a special race between three Motorettes, the three-wheeled car built in Hartford. It was intended to make it a five-mile affair, but after one mile had been completed it was announced that another would finish it. The winning car covered the two miles in 5:14 2-5. DePalma then brought out his Simplex to go after the five-mile record, and he won.

The event for non-stock cars, Class C, Division 3 C, 231-300 cubic inches, for five miles was won by DePalma, driving a Mercer, in 5:19 1-5; Brainard, in a Cole 30, getting second place, and Beach in a Mercer third. DePalma won first in a five-mile free-for-all in a Mercer, with Brainard second and Beach third.

A parade of 1912 cars and various gymkhana events completed the program. The summaries:

Record Trial, 1 Mile—(Record, 0:51 3-5)

Position.	Car	Driver	Time
	Simplex	DePalma	0:52.20

Record Trial, 5 Miles—(Record, 4:24 2-5)

	Simplex	DePalma	4:23

Non-Stock, Class C, 231-300 Cubic Inches

1.	Mercer	DePalma	5:19.20
2.	Cole "30"	Brainard	5:44.80
3.	Mercer	Beach	5:54

Non-Stock, Class D, Free-for-All, 5 Miles

1.	Mercer	DePalma	5:14
2.	Cole "30"	Brainard	5:33
3.	Mercer	Beach	5:40

15-Mile World's Record Trial

Simplex	DePalma	Unfinished

Lee Oldfield Held Without Bail

SYRACUSE, N. Y., Sept. 23.—Lee Oldfield, whose racing machine crashed into the crowd at the State Fair grounds last Saturday and killed 11 persons, appeared before Coroner George R. Kinne yesterday to testify to conditions leading to the accident. Though for several days his nerves were totally unstrung, and at one time the hospital attendants feared for his reason, he was much improved yesterday, though much affected while giving testimony. At the inquest Oldfield gave his age as 22, his residence as Wilkes-Barre, Pa., and stated that he was married and had an infant daughter. The driver placed two licenses in evidence to show that he was considered competent to pilot a car. The tire that burst and caused the accident was thoroughly examined, there being a gash of almost a foot in the shoe and a rent of about equal length in the inner tube. Oldfield admitted it was worse than he realized, but said that such a condition might exist on the inside and yet have the outer tire apparently sound.

In regard to the moot question of whether Oldfield was signaled to hit up speed, he said his manager, Mr. Moross, signaled him to that effect after completing his thirty-ninth mile. Till then he had been shutting off his power right after leaving the grand stand, to make the turn in safety on the mile course; but after getting the signal he went as far as the bend without shutting off the power. He testified that the tire that burst was the one that was getting the most strain, being the first to hit the embankment on the cut across.

Bail was refused for Oldfield, he being under technical arrest. The inquest will be continued and is certain to be exhaustive. Meanwhile, Oldfield is under the surveillance of a plain clothes man while at the hospital. He expects in a day or two to remove to a hotel.

Preparing for Fairmount Park Race

PHILADELPHIA, Sept. 23—Active preparations are under way by the Quaker City Motor Club for the fourth annual Fairmount Park road race to be held on Saturday, October 7. Steam rollers, watering carts and a gang of men are at work daily getting the course in ship shape, and in order to have the roadway in as perfect condition as possible, there will be no letup in the work by the organization until the day of the race.

As was the case last year, the proceeds from the sale of seats and parking places will be donated to various charitable organizations.

The entries at present time are: Lozier, to be driven by Ralph Mulford, runner-up last year; Len Zengle, who won the event last year with a Chadwick, will drive a National in the coming race; National, Donald Herr; Fiat, Lee Oldfield; Case, Joe Jagersberger, and Stutz, G. Anderson.

Glidden Tour Has 61 Entries

There are now 61 entries filed for the Glidden Tour. Those entering during the past week are as follows: L. C. Brown, Athens, Ga., Mitchell; P. D. Sandlin, Jasper, Fla., Cadillac; Bishop and Varner, Athens, Maxwell; J. J. Howard, Jacksonville, White; L. C. Denmark, Jacksonville, Cadillac; R. S. King, Arcadia, Fla., Cadillac; Carolina Portland Cement Company, Atlanta, Ford; E. M. Willingham, Atlanta, Ford; J. O. Teasley, Alpharetta, Ga., Ford; C. A. McCardle, Indianapolis, E-M-F; and Athens Motor Company, Athens, Columbia.

Coming Contests on Track and Road

NEW YORK CITY—What may prove to be the last track races to be seen in the Metropolitan district this season will be staged at Guttenberg, N. J., on Saturday afternoon. The card contains 4 dashes at five miles and 2 at ten miles for non-stock cars. Second money is offered in all the events.

OMAHA, NEB., Sept. 25—The Omaha Speedway Association will pull off a series of four days' racing on next Saturday, September 30, Sunday, Monday and Wednesday. Men have been at work on the track improving it and building better fences, but this will all be completed before Saturday. There will be a 50-mile event each day, with shorter races. The Ak-Sar-Ben festivities will bring large crowds into the city.

SAN FRANCISCO, Sept. 23—An international automobile race in Golden Gate Park, in this city, on Washington's birthday, February 22, next year, is the plan of the publicity committee of the Panama-Pacific International Exposition Company.

OKLAHOMA CITY, OKLA., Sept. 23—The 800-mile route of the *Daily Oklahoman* reliability run of 1911 will start on October 12. The entries will include not less than sixty cars.

Trade and General News High Lights

DETROIT, MICH., Sept. 25—In reply to the injunction bill filed by the Hupp Motor Car Co., R. C. Hupp, of the Hupp Corporation, maker of the new R. C. H. car, made the following statement:

"In view of the pleasant relations which have always existed between the Hupp Motor Car Co. and myself, I am very much surprised, indeed, to hear of this action. They have known for several months of my intention to place upon the market a new gasoline car, to be handled by the Hupp Corporation.

"In the naming of the new car, I was careful to avoid choosing a name that would conflict in any way or tend to injure the business of the Hupp Motor Car Co., and, although the name 'R. C. H.' is my own initials, it does not seem to me there is anything in the name of the new car to which to take exception.

"As for the Hupp Corporation, it is a combination of five large automobile parts plants, organized several months ago, consisting of a large foundry, drop forgings plant, machine shops, electric and gasoline car assembly plants. For nearly a year we have been engaged in the manufacture of automobile parts and in the building of electric and gasoline cars, including the Hupmobile, and in all that time there has never been a word of objection from anyone to the use of the name 'Hupp' in connection with our business. All the castings and forgings and machine parts in the Hupmobile are made, and the final assembly and shipping of this car is done at this plant.

"We have one of the most completely equipped automobile factories in the world, with a capacity of 60 cars a day, and, with the additions contemplated, we will increase this capacity by nearly 50 per cent.

"The Hupp Corporation was named for my brother, L. G. Hupp, who was in active charge at the outset. Since severing my connection with the Hupp Motor Car Co., in August, I have been devoting my entire time and attention to the affairs of the Hupp Corporation. Neither my brother nor myself, nor anyone by the name of 'Hupp' is now connected with the Hupp Motor Car Co. We have notified the Hupp Motor Car Co. that we shall be unable to manufacture any more parts for their cars after November 1. We are planning to market 10,000 new R. C. H. cars during the season of 1912, and our facilities here will be taxed to the limit in turning out our own product."

Atlanta Automobile Row Is Growing

ATLANTA, GA., Sept. 25—Eleven makers are represented in Atlanta by branch houses or by concerns that amount to that. Here is the list: Overland Southern Motor Company, United Motor Atlanta Company (Maxwell, Columbia, Sampson, Stoddard-Dayton and Courier), Mitchell-Lewis Motor Company (Mitchell), J. I. Case Threshing Machine Company (Case), Ford's Southeastern branch, Corker Motor Car Company (in effect a branch for the Haynes, also carries the Matheson), Stearns Southeastern branch, Southern branch Buick Motor Company, Southeastern Studebaker branch (E-M-F and Flanders).

In addition to the eleven branches, the Gate City of the South has eleven active agencies, most of which are housed in their own places of business with garage accommodations. These are: Krit Motor Atlanta Company, Cole Motor Company of Georgia, Steinhauer and Wight (Cadillac), Scott Motor Sales Company (Pathfinder), Central Auto Supply Company (Imperial), John M. Smith (Pierce-Arrow), Fulton Auto Supply Company (Peerless, Marmon, American and Gramm), E. D. Crane and Company (Hupmobile and Columbus Electric), Clifford V. Anderson (Corbin), Northcutt Company (Chalmers), W. M. Leathers (Dorris), The Auto Company (Thomas, Alco, Oakland), Herman J. Haas (Winton, Rauch & Lang Electric).

Automobile Eases Rigor of Car Strike

DETROIT, MICH., Sept. 25—Detroit experienced a little object lesson last week that fully convinced everybody that the motor car is a public necessity instead of being merely a luxury. Without warning, Wednesday morning, the city found itself with a street car strike on its hands, the first in 20 years. Not a wheel turned for the purpose of carrying passengers all that day, and yet, thanks to the motor car, citizens were not seriously discommoded. There was considerable confusion in the early morning hours, but toward noon things were running along fairly smoothly. Factories were running as usual, though short-handed in many instances. The downtown stores were well patronized, and even the theaters did a good business.

The worst sufferer, perhaps, was the State Fair management. But for the automobiles, the fair would have been deserted and there would have been nothing left to do but to close down. Motor 'bus lines were quickly established, however, and the fair was well patronized in spite of the high tariffs exacted by the enterprising 'busmen.

Cincinnati Dealers' Used-Car Scheme

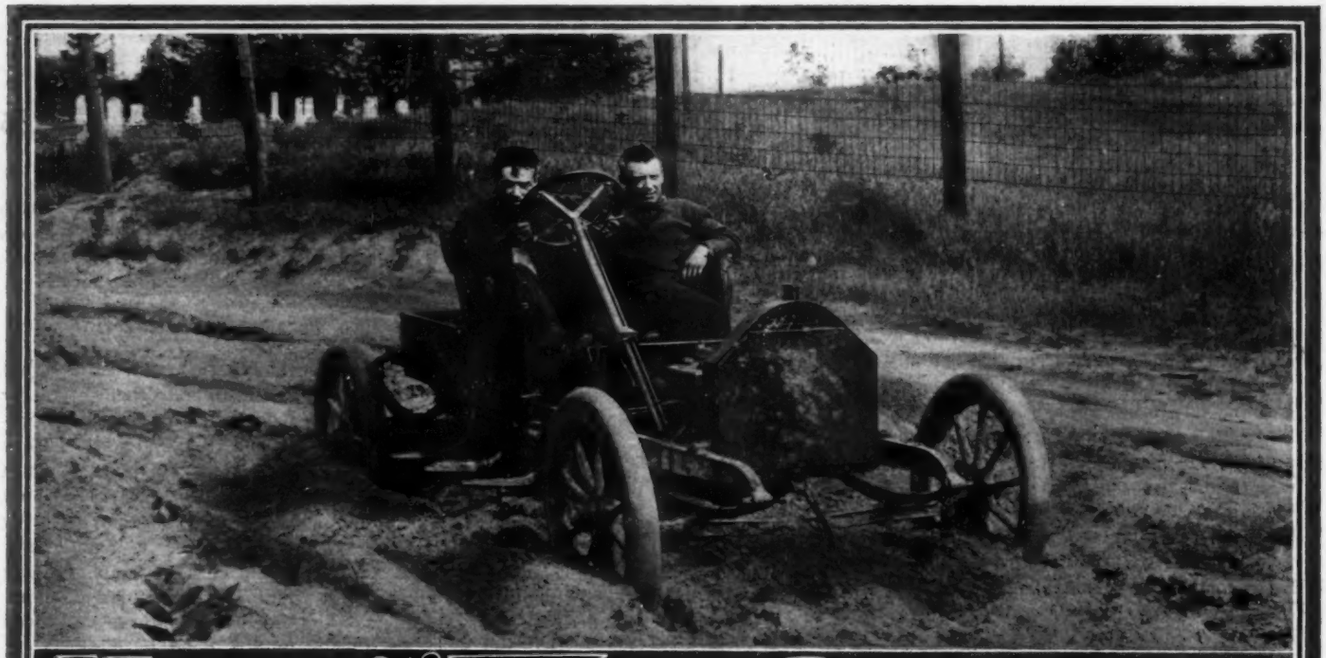
CINCINNATI, Sept. 25—The details for a new system in the trading of broken down and second-hand machines, in part payment for a new automobile, are being put in practical shape for operation here. It will be under the auspices of the Cincinnati Automobile Dealers' Association, and probably operated by the association itself.

The proposition is to establish a general clearing house for second-hand and broken-down cars, with an efficient and independent general manager and corps of expert mechanics. The machines are to be put in first-class order and placed on sale at the expense of and for account of the owner, thus obviating present abuse of legitimate competition in fixing values on them. Under such an arrangement the dealer would not need to fix the price on the machine to be traded, the association to assume that responsibility, together with its repair and sale.

Saurer and Mack Companies Combine

CHICAGO, Sept. 25—The International Motor Co., with headquarters in New York City, is the title of a new holding and sales company formed by the interests controlling the Saurer Motor Co. and the Mack Brothers Motor Car Co., of which C. P. Coleman, president of the Saurer company, is at the head. The International only was formed last week, and so far there has been no announcement as to the officers or the capitalization.

The organization of the International company marks a departure in commercial motor vehicle circles in that it brings together the Saurer and Mack interests. The new concern, it is said, will act as a sales agent for the two lines of trucks, the idea being that both will save in the expense of marketing their product without in any way interfering with the methods of the two companies as at present constituted. Each will retain its individuality, but the two lines will be marketed by the International company. The combination gives a line of American-made trucks that extends from 1 to 7 tons inclusive.



NEWS of the WEEK CONDENSED

DETROIT, MICH.—The testing out of chassis before they are finally passed upon by the factory experts is carried to the extreme at the Everitt plant. The chassis are put through a stretch of deep sand on high gear, and unless they perform satisfactorily the inspection department refuses to O. K. them.

BUTTE, MONT.—Meritt & Riley have been signed up by the Franklin Automobile Company as dealers for the coming season, succeeding The Butte Novelty Works.

NEWARK, N. J.—The Johnson Auto Conveyance Company has been established here. The company now employs four Johnson trucks for its freight carting business.

BOSTON, MASS.—Harold D. Bornstein has been appointed manager of the New England branch of the Velie Motor Vehicle Company, with headquarters at 92 Massachusetts avenue.

WASHINGTON, D. C.—E. C. Bull has been appointed manager of the Pope Automobile Company, agent for the Oakland and Pope-Hartford. Lawrence Schenk has been made manager of sales.

BOSTON, MASS.—George E. Stuart, deputy street commissioner of Newton, is being considered as the successor of Chairman Harold Parker, of the Massachusetts State Highway Commission, now that the latter has sent in his resignation. Mr. Stuart is a practical road builder, having been connected with the street department of Newton for many years.

PHILADELPHIA—The South Jersey Motor Club will hold a race meet on the fair grounds half-mile track at Bridgeton, N. J., next Saturday. So far twelve cars have been entered.

MERIDEN, CONN.—The Connecticut Telephone and Electric Company and the Connecticut Shock Absorber Company have opened a joint branch at 819A Boylston street, Boston, Mass.

NEW YORK—The Pope-Hartford Automobile Company has taken over the business of the Pope Motor Company of Jersey City. B. F. Ellsworth will have charge of the new office.

MILWAUKEE, WIS.—H. W. Ellis, of Chicago, will hereafter head the sales department of the Johnson Service Company's automobile department here. Mr. Ellis is a new man in the automobile field.

FINDLAY, OHIO—At a Fall festival at Defiance this week forty automobiles paraded for prizes. The first prize lay between Mayor Chenevert and Glen Coy, but a flip of the coin gave it to the Coy machine.

BALTIMORE, MD.—The D. C. Walker Automobile Company has become the Baltimore representative for the Stearns Silent Knight. The company expects to receive the demonstrator within the next few days.

YORK, PA.—Harry R. Pfeiffer, 537 West Market street, has taken the agency for the Stoddard-Dayton automobiles. Mr. Pfeiffer has the sole agency for the Baker Electric for York, Adams and Lancaster counties.

OTTAWA, CAN.—The first annual automobile and motor boat show to be given at Ottawa will be staged from April 6 to 13, 1912, at Howick Hall, under the auspices of the Ottawa Valley Motor Car Association.

HARRISBURG, PA.—The Fall sociability run of the Motor Club of Harrisburg was held last Thursday to the Allentown fair. Secretary of the club, J. Clyde Myton, laid out the route to Allentown which is about 93 miles. A dozen cars were entered in the run.

INDIANAPOLIS, IND.—Nordyke & Marmon Company has entered four cars in the Santa Monica races to be held on the great California course on October 14 according to an announcement made from the factory.

BALTIMORE, MD.—The Lambert Automobile Company is preparing to occupy new quarters at Mount Royal and Maryland avenues. The company handles the Maxwell, National and Hudson cars in Baltimore and vicinity.

DETROIT, MICH.—Harry Grant will drive the Lozier car owned by Dr. W. H. Chambers in the Fairmount Park road race October 7. Grant will act as a member of the Lozier team despite the private ownership of the car.

BALTIMORE, MD.—The Automobile Company of Maryland, agents for the Kissel Kar and truck in this city and the State of Maryland, has moved its quarters from the Academy of Music building to 103 North Liberty street. Robert Stein is manager.

PHILADELPHIA — The Paxton-Crumley Automobile Company, local distributors of the Warren car and of the Warren commercial delivery car, is installed in new headquarters at 660 North Broad street, where an up-to-date agency has been established.

TOLEDO, OHIO—The pathfinder car for the Chicago Motor Club Five States Reliability Contest arrived here this week. The car is in charge of J. P. Dods and is driven by George Daubner. It is expected that the procession will pass through Toledo next month.

PITTSBURGH—The Vestal Motor Car Company has purchased a site for a service station which will cost $25,000. The company handles the trucks of the Universal Motor Truck Company of Detroit. The building will be at Grant Boulevard and Craig street.

CONNERSVILLE, IND.—A movement is on foot to provide street car service by a system of motor cars of thirty passengers capacity each. It is believed this would be as practical as an electric street car system, and that motor cars could be installed at much less expense than an electric rail line.

COLUMBUS, OHIO—The Robert F. Boda Automobile Company, of 25 North Fourth street, has closed contracts to handle the Mitchell in eighteen counties in Central Ohio for 1912. Subagencies will be selected later. The same company will cover fourteen counties in Central Ohio for the Thomas.

YORK, PA.—Norman R. Galletin, chief road tester for the past seven years, and Steward E. Myers, foreman in the finishing department of the Pullman Motor Car Company's plant, have purchased the Penn Park Garage, Park and Mason avenue, from A. B. Oden, and changed the name to the Central Garage.

BOSTON—At the meeting of the New England branch of the Electric Vehicle Association of America, at the Edison Building, Boston, an address was delivered by Stephen G. Thompson, of the Public Service Electric Company, of Newark, N. J. Mr. Thompson's subject was "The Electric Vehicle and the Central Station."

KENOSHA, WIS.—The Chicago Brass Company, of Kenosha, Wis., has purchased the buildings and real estate of the Frost Manufacturing Company, which has been specializing in plumbers' goods, and will add the property to its already large plant. The two plants adjoin and the purchase gives the Chicago company a solid block.

TOLEDO, OHIO—The Willys - Overland Company has installed a daily report system by which the office sales force is kept informed of crop, weather and commercial conditions from all parts of the United States, Canada and Mexico. George W. Bennet is in charge of the system and will use it as a barometer in his distribution of cars.

TOLEDO, OHIO—Plans are being made for the organization of a new automobile club here. The idea had its inception last week when the automobile dealers' association met for the purpose of electing officers. The club will not be a dealers' affair in any way and no one who sells automobiles will be permitted to hold office in the organization.

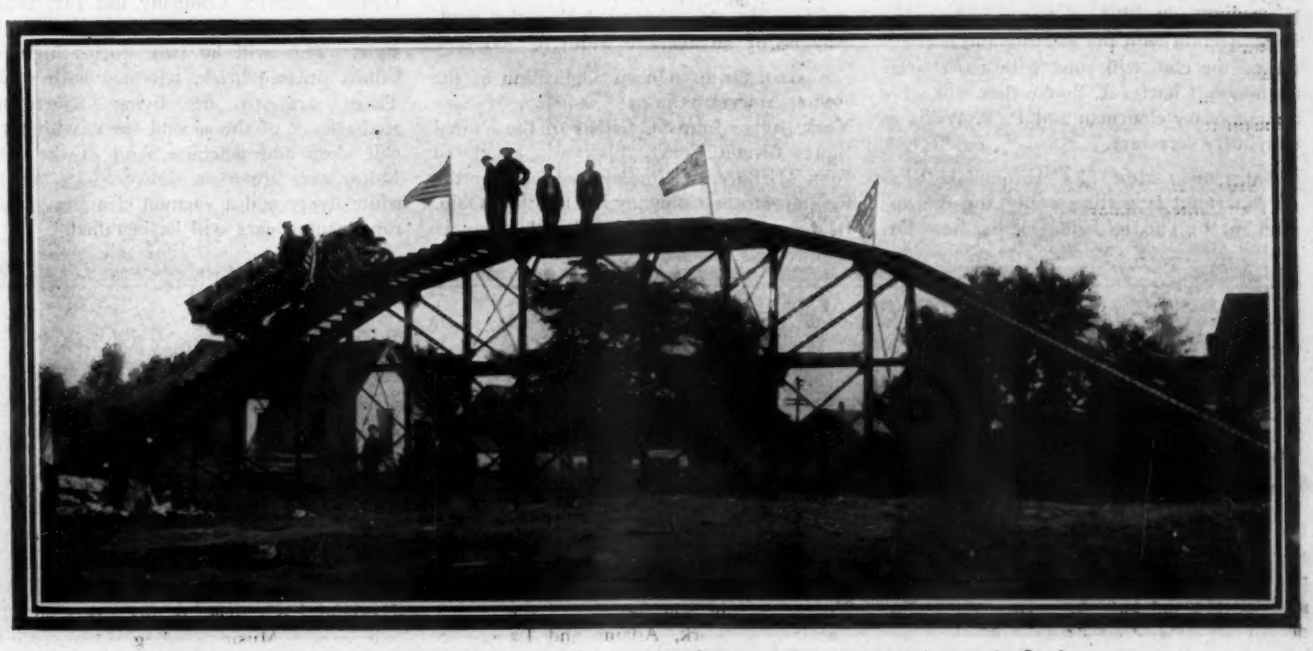
NEW YORK—The International Motor Service Association was formed last week with the avowed purpose of concentrating the purchase of supplies for taxicab, delivery and public service corporations throughout the country. Charles C. James, general manager of the taxi-cab division of the United States Motor Company, is the founder.

CORLISS, WIS.—W. Owen Thomas, designer of the Owen-Thomas Six, an all-steel car, the rights to manufacture which are owned by the leading stockholders in the Wisconsin Engine Company, of Corliss, has been granted patents on a buffer mechanism for motor cars. It is supposed that the engine company will manufacture the device on a large scale.

MILWAUKEE, WIS.—Although it has only just started to administer the new Wisconsin State aid for road building law, the Wisconsin Highway Commission has already found the $350,000 annual appropriation insufficient to meet the demands for State aid and has been obliged to scale down the requests of townships and counties to make both ends meet.

ANDERSON, IND.—The Remy Electric Company has announced that it will award cash prizes to the winners in the various events in the Fairmount Park Road Races, at Philadelphia, October 7, and in the Santa Monica races at Los Angeles, October 14. These prizes will be in gold, payable to the drivers, and are conditional upon the cars being equipped with Remy ignition.

SAN FRANCISCO—The Indian Refining Company of New York, manufacturers of Havoline oils, has organized the Indian Refining Company of California as a subsidiary corporation to handle its products on the Pacific Coast. Offices have been established in this city in charge of H. R. Gallagher and J. D. Van Eck, and arrangements are being completed to take care of the entire Pacific coast trade from a central office in this city.



Fifty per cent. gradient over which the Buckeye Manufacturing Company, of Anderson, Ind., tests its Lambert cars

DES MOINES, IOWA—The Cunningham Auto Company has taken the Des Moines agency for the American Traveler car and made a first delivery here last week.

SAN FRANCISCO—The Pioneer Commercial Auto Company of Los Angeles has established a branch in this city for the handling of the Reliance, Rapid and Randolph trucks, all of the General Motors line. F. W. Ball is in charge.

BAY CITY, MICH.—Work has been begun on Bay City's latest industry, the National Auto Truck Company's plant. The contract for the excavations has been let and the work will be completed as rapidly as possible. The contracts for the buildings will be let in parcels, none of the bids for the entire work having been satisfactory.

CHICAGO, ILL.—Instead of being held the week of September 30-October 7, the fall opening of the Chicago Automobile Trade Association will take place a week later, October 7-14, the postponement being caused by inability to complete the electric lighting of the row by that time. At present the dealers have a large fund raised for the purpose of conducting the show.

MILWAUKEE, WIS.—Albert F. Gumz, a member of the Milwaukee County Board of Supervisors, has been granted letters patent on a new type of carburetor or generator for motor cars. The device is a simplification of the ordinary carburetor and is claimed to give positive mixtures at all speeds without numerous adjustments. It is also claimed to be practically climate-proof.

INDIANAPOLIS, IND.—It is expected that a permanent organization of the Hoosier Motor Club will be perfected at a meeting of automobile owners to be held at the Claypool Hotel on the evening of September 29. There will be a dinner and smoker in connection with the meeting and it is expected the club will start with 100 charter members. Charles A. Bookwalter will serve as temporary chairman and P. P. Willis as temporary secretary.

BALTIMORE, MD.—The Automobile Club of Maryland is getting ready for the annual meeting to be held October 10. Dr. H. M. Howe, president; Thomas G. Young, treasurer; H. M. Luzius, secretary, and Osborne I. Yellott, counsel, are candidates for re-election. Vice-President Joel G. Nassauer will not run again for office. At a recent meeting the club issued warnings to motorists concerning a speed trap on Wilkins avenue, near the city limits.

FLINT, MICH.—During the Genesee County Fair, October 3, Bob Burman, in his Blitzen Benz, will have a try at the record. The other events for automobiles at the fair are as follows: Cars, Class C, non-stock, cars from 161 to 230 inches piston displacement, five miles. Prize trophy—Cars, Class C, non-stock, cars from 231 to 450 cubic inches piston displacement, three miles. Cars, Class C, free-for-all, three miles. Cars, Class C, free-for-all handicap, three miles.

BALTIMORE, MD.—The Oakland Sales Company, 107 West Mount Royal avenue, of which T. R. Jones is manager, has been appointed the agency for the new R. C. H. car. The company expects to get the first consignment of cars some time during next month. Manager Jones of the Oakland Sales Company has just returned from the Oakland factory in Pontiac, Mich., where he arranged for the shipment of the 1912 Oakland cars. The Oakland Sales Company will move to its new quarters at 6 and 8 East Chase street after November 1.

BALTIMORE, MD.—A report on the proposed plans for the Green Spring avenue boulevard within the city limits was submitted to Mayor Preston by Major Joseph W. Shirley, of the Topographical Commission. This avenue leads from the famous Druid Hill Park to the beautiful Green Spring Valley in Baltimore County, the home of many of Baltimore's smart set. In his report Major Shirley explains that it will cost $130,000 to carry out the improvements. He also suggested that the roadway be of an average width of 300 feet.

TOLEDO, OHIO.—On an application of the Ewing-American Motor Company, of New York, Judge John M. Killets of the United States Circuit Court, this week, appointed John M. Barr, of Findlay, receiver for the Findlay Motor Company, of Findlay, Ohio. It was alleged that while the company is not insolvent, it owes debts in excess of $50,000 and has not the necessary working capital to continue business and conserve the best interests of the company. Representatives of the concern consented to the appointment. Bond in the sum of $25,000 was immediately given by the receiver who is now in charge.

WASHINGTON, D. C.—Under bids opened some weeks ago the Bureau of Yards and Docks, Navy Department, has awarded the General Vehicle Company, of Long Island City, the contract for furnishing twelve electric trucks to navy yards at Portsmouth, N. H.; Boston, New York, Norfolk, Charleston, S. C.; Mare Island, Cal.; Puget Sound, Wash., and Guam. The contract price was $49,000. Eight of the trucks will be 5,000-pound machines in four of them 10,000-pound trucks. The 5,000-pound trucks will be of the express type, while the others will be of the stake type. Delivery is to be made within six months.

INDIANAPOLIS, IND.—K. W. Brewer and E. L. Baker have formed the Baker-Brewer Company and have taken the agency for the Baker electric. They have obtained quarters with the downtown salesroom of the National Motor Vehicle Company at 426-428 North Capitol avenue. The Haynes Automobile Company, of Kokomo, has opened a factory sales branch in Indianapolis at 514 North Capitol avenue, with R. P. Dillon as manager. A factory sales branch of the Auburn Automobile Company has been established at 518 North Capitol avenue. Formerly the Auburn was handled by the Finch-Freeman Auto Company.

INDIANAPOLIS, IND.—There is a constantly increasing demand for garages in the residence districts and there is a tendency to erect such garages to conform to the architectural surroundings. The Automobile Owners' Service Company has just begun the erection of a building on the colonial style. This will be two stories high, of yellow pressed brick, trimmed with white. There are to be living apartments at the front of the second story, with a repair shop and machine shop in the rear. Motor cars are to be delivered by men in white livery and a vacuum cleaning system for cleaning cars will be installed.

Among the notable features of the early autumn shipping season is the solid trainload of Flanders cars which left the factory

CINCINNATI, O.—It has been decided by the Cincinnati Automobile Dealers' Association to hold its second annual show in Music Hall during the month of February next. Contract has been listed for the hall, the exact date to be announced soon.

MILWAUKEE, WIS.—Good roads was one of the principal subjects for discussion at the annual convention of the National Rural Letter Carriers' Association in Milwaukee, September 20 to 23. Traveling an average of 26 miles per day on the roads of the United States, the rural carriers are to be considered among the best judges of roads. Several motor car manufacturers made exhibits at the convention, among them Mitchell-Lewis Motor Company, Racine, Wis.; Petrel Motor Car Company, Milwaukee; Schacht Motor Car Company, International Harvester Company and Maxwell-Briscoe Mfg. Company.

SAN FRANCISCO, CAL.—Announcement is made by the Motor Car Dealers' Association of San Francisco that no gasoline pleasure vehicle show will be held in this city by them or under their sanction. This means that there will be no show this season, for, after the unpleasant experience of private promoters who attempted to hold an exhibition last March against the wishes of the association, it is not probable that any such will be attempted again. At that time the organized dealers published several announcements that they were not participating, and this, combined with bad weather, resulted in serious financial losses to the promoters.

MILWAUKEE, WIS.—As a result of the convincing demonstrations and tests made by manufacturers of motor-propelled fire-fighting equipment during the twenty-third annual convention of the International Association of Fire Engineers in Milwaukee, September 19 to 23, the Common Council of Milwaukee will proceed at once to motorize the entire equipment of Central Fire Station, Broadway and Oneida street.

MONTREAL.—The $6,400 motor-driven combination hose wagon and chemical engine, which was authorized by the Westmount Council Tuesday night, will be the first piece of fire-fighting apparatus of its kind to be adopted in Montreal and in fact in the province of Quebec. Westmount's experiment will be watched with interest by the Montreal Fire Department, which has for some time past been contemplating the purchase of a similar piece of apparatus.

GRAND RAPIDS, WIS.—The Commercial Club of Grand Rapids has obtained sufficient subscriptions to meet the guarantee demanded by W. A. Crowe, of Detroit, who proposes to manufacture a new 30 horsepower car to be known as the Crowe. It is now considered certain that the new Crowe plant will be established in Grand Rapids. It is proposed to incorporate for $200,000, of which amount $40,000 is to be awarded to Mr. Crowe and W. M. McIntyre, designer of the car, as their share for patent rights, designs, tools, etc.

SAN FRANCISCO—The White gasoline pleasure cars are now handled in San Francisco by the Davis Auto Company, organized for the purpose. The White company's branch here retains the truck end of the market. Frank H. Davis, long associated with the White branch, is manager of the Davis Auto Company.

RICHMOND, VA.—With the proviso that the money be expended within ten miles of the city, the finance committee of the City Council has recommended the appropriation of $5,000 by the Council toward the Gordonsville-Richmond-Old Point highway improvement. Private subscriptions amounting to over $6,000 have been made toward the improvement of the highway, and more donations are being solicited. The counties and towns along the highway are coming across liberally and every indication is that a sum sufficient to put the highway in the very best of condition will be raised.

CHARLOTTE, MICH.—The Duplex Power Car Company's affairs took a new turn when the adjourned annual meeting of the company was held and an entirely new set of officers and directors was chosen to take charge of affairs, comprising Frank P. Town, James H. Brown, Robert Donovan, W. G. Wisner, Frank King, W. B. Fulton and M. J. Lamson, all local men. Later the board met and elected the following officers: President, Frank P. Town; vice-president, Frank King; secretary, W. G. Wisner; treasurer, Carroll S. Brown.

Automobile Incorporations

AUTOMOBILES AND PARTS

BOSTON, MASS.—Hollander Motor Co.; capital, $15,000; to sell motor vehicles. Incorporators: Wilkie B. Hollander, George M. Wetherbee, Robert A. Jordan.

DAVENPORT, IA.—Davenport Auto Co.; to deal in motor cars. Incorporators: A. A. Liberman, Charles E. Frey.

FAIRBURN, GA.—Piedmont Auto Manufacturing Co.; capital, $100,000; to build automobiles. Incorporators: Robert F. Butler, W. L. Moor, H. Knight.

MARIETTA, OHIO.—Pioneer Motor Car Co.; capital, $18,000; to make and deal in automobiles. Incorporators: Tasker B. Bosworth, A. J. Watson, A. A. Crawford, T. McCune, H. B. Coen.

NASHVILLE, TENN.—Hicks Motor Truck Co.; to make freight automobiles. Incorporators: W. L. Hicks and others.

NEWARK, N. J.—Merchants Motor Car Co.; capital, $500,000; to manufacture automobiles.

PROVIDENCE, R. I.—Providence Motor Car Co.; capital, $25,000; to sell automobiles and conduct garage business. Incorporators: John A. McDonald, William H. McSoley, Alice Stanton.

RICHMOND, VA.—Motor Truck Corporation; capital, $25,000; to operate a motor transfer business. Incorporators: H. A. Gillis, T. M. Garrity, Charles Laurens, E. P. Cox.

UTICA, N. Y.—Tompkins-Creedon Co.; capital, $5,000; to deal in automobiles. Incorporators: Wm. Tompkins, Dennis P. Creedon, Ella Creedon.

TERRE HAUTE, IND.—Smith Motor Car Co.; has changed name to Terre Haute Motor Co.

WILMINGTON, DEL.—Union Motor Car Co.; capital, $25,000. Incorporators: Edmund S. Hellings, Charles B. Bush, Armon D. Chaytor.

AUTOMOBILE GARAGES, ACCESSORIES, ETC.

BUENA VISTA, VA.—Buena Vista Garage & Automobile Co., Inc.; capital, $5,000. Incorporators: W. B. Pritchard, S. H. Yoekely, D. S. Bromley, N. B. Pritchard.

CLEVELAND, OHIO.—Sea Island Tire Co.; capital, $15,000; to make and sell tires and tire protectors. Incorporators: J. C. Brooks, A. L. Welch, A. C. Miller, D. C. Westenhaven, W. H. Boyd.

NEW YORK CITY.—Green's Auto Vans Express Co.; capital, $12,000. Incorporators: James C. Green, Michael Green, Daniel S. Green, Joseph Green.

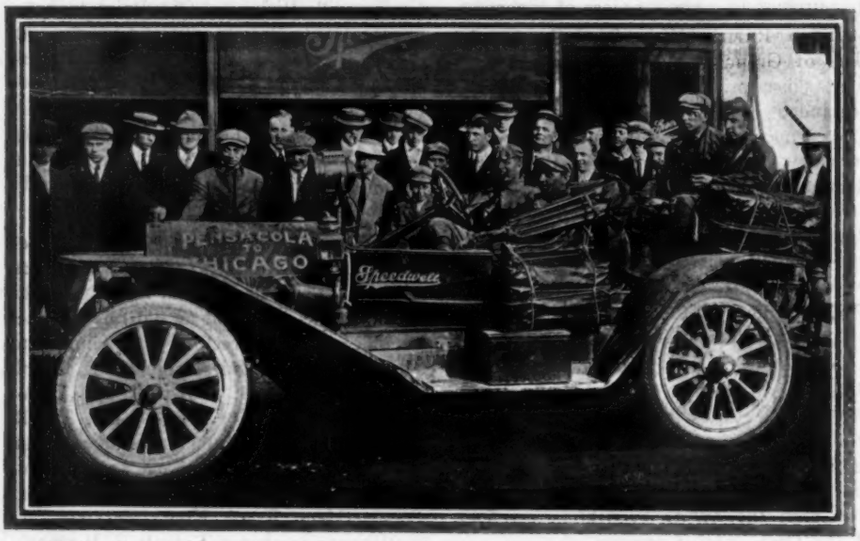
NEW YORK CITY.—Smith Gasoline Meter Co.; capital, $350,000; to make and deal in engines, motor cars, etc. Incorporators: W. H. White, Jr., D. M. Baldwin, W. H. Brady.

CAMDEN, N. J.—New Jersey Automobile & Supply Co.; capital, $125,000; to sell automobiles. Incorporators: H. Morgan Hatch, J. R. Mick, Wilfred B. Walcott.

JERSEY CITY, N. J.—Moran's Garage & Auto Co · capital, $25,000; to sell automobiles. Incorporators: Ottilie R. Moran, John E. Moody, Wm. A. Higgins.

at Detroit for the Kansas City branch recently. The train was made up of 34 cars, and 100 automobiles constituted the shipment

OF INTEREST to the INDUSTRY



CHICAGO, ILL.—There recently arrived here from Pensacola, Fla., the Speedwell Pathfinder, which left the Southern city nine days before to lay out a Gulf-to-Lakes route designed to facilitate and encourage motor travel between the South and North. The trip was made under the auspices of the Pensacola Commercial Association, with Dr. Mallory Kennedy in direct charge of the work. Although no effort was made to cover the distance speedily, the time consumed on the long journey is considered remarkably fast. The information gathered en route by Dr. Kennedy is to be put into convenient shape by the Association.

SYRACUSE, N. Y.—R. A. Vail, assistant chief engineer in the Franklin factory, has resigned. A delivery wagon of 1,000-pound capacity is a feature of the commercial car line of the Franklin Automobile Company as it is presented for the coming season.

RACINE, WIS.—The J. I. Case Threshing Machine Company is now giving its new petroleum engine a thorough tryout in connection with a threshing machine. The motor car department of the Case company is taking considerable interest in the new type and experiments are being made in this department. The engine is designed by David Evans.

SYRACUSE, N. Y.—John A. Nichols, Jr., former district manager for the Franklin Automobile Company in the Canadian and American Northwest, has been made superintendent of the Franklin branches with headquarters here.

GRAND RAPIDS, MICH.—The Mercury Manufacturing Company, a Chicago firm which manufactures the Mercury half-ton trucks, has chosen Grand Rapids as the place to enter into Michigan competition. Its first branch in this State has been established at 318 Kent street. The company is represented by James Hoogerhyde and C. Fisher.

CHICOPEE FALLS, MASS.—H. B. Curtiss was recently placed in charge of the Service Department of the Stevens-Duryea Company at its factory. Mr. Curtiss was formerly connected with the Pierce-Arrow factory organization.

DETROIT, MICH.—By the middle of November the Abbott Motor Company expects to get into its new addition. This building is 40 by 160 feet and will be used for final assembly and general storage purposes. The new office building will be ready by Oct. 20.

LIMA, OHIO—Steps have been taken by the Gramm Motor Car Company of Lima, Ohio, to increase the capital stock of the corporation from $300,000 to $1,250,000, for the purpose of increasing the output of the plant. Of the increased stock half will be common and the other preferred.

DES MOINES, IOWA—W. R. Jones has been named manager and has taken charge of the Des Moines branch of the United States Motors Company. Mr. Jones was formerly in charge of the Kansas City branch. He succeeds H. B. Groves, who has gone to the Pacific Coast.

AMESBURY, MASS.—The new plant of the Castle Lamp Company at Elmira, N. Y. is approaching completion and will be ready for occupancy October 15. The building is 227 by 85 feet, three stories high and constructed of steel and cement. The Amesbury plant will be removed to Elmira.

SAGINAW, MICH.—John Trumble, of Detroit, has been appointed superintendent of the engineering department of the Marquette Motor Company and has assumed his new duties. The Saginaw plant is being used strictly as a manufacturing adjunct to the General Motors Company, and besides building its own cars is making all parts of Welch-Pontiac and Welch-Detroit cars and furnishing them to owners of these automobiles.

LANSING, MICH.—The fiscal year of the General Motors Company has been changed so as to end July 31 in place of September 30, as heretofore, in order to permit the manufacturing department to take inventory at the most convenient time of the year. This will mean that the forthcoming statement of earnings will be for a ten-months' period, running from October 1, 1910, to July 31, 1911.

LOUISVILLE, KY.—Berton B. Bales has resigned as president of the American Automobile Manufacturing Company, whose offices and plant are situated across the river from this city in New Albany, Ind. It is understood that George H. Wilson, of Louisville, will be selected as Mr. Bales's successor. The later will retain his interest in the company, but will devote his time to his private business affairs. The company makes the Jonz car and at present about sixty workmen are employed.

BROCKVILLE, CANADA—The Brockville Atlas Motor Car Company, with a capital of $200,000, has been established at Brockville, Ont. A new factory with all the latest facilities is in course of construction. This company will build four different types of cars—touring car, runabout (two models) and commercial car. All the parts will be built by the company with the exception of the engine and body. The engine will be the output of The Atlas Engine Works of Indianapolis and the bodies constructed by the Canada Carriage Company. Mr. T. J. Storey is the managing director.

AKRON, OHIO—The annual meeting of the stockholders of the Swinehart Tire & Rubber Company was held at the offices of the company recently. Very satisfactory reports were made of the progress of the company during the past year, the business showing an increase over the previous year of 200 per cent. The prospects for the coming year are very good, the factory operating day and night to take care of the increased business. The following were elected as directors for the ensuing year: August Blossman, R. A. May, L. Mather, Wm. McWeldon, W. W. Wuchter. After the stockholders' meeting the board was organized and the following officers elected: W. W. Wuchter, president and general manager; Joseph Dangel, vice-president; C. O. Baughman, secretary; R. A. May, treasurer.

PATENTS GONE TO ISSUE

ROLLER BEARING—Anti-friction bearing containing two sizes of rollers.

2. The bearing shown in Fig. 1 comprises spaced concentric race rings I and O, the inner ring I having a peripheral groove G with outwardly inclined edge portions at its sides. Ring I also has annular wearing surfaces W on opposite sides of the edge portions mentioned, and at the outer edges of these annular surfaces radially disposed flanges are spaced. Working rollers R1, the ends of which have beveled edges, are located in the peripheral grooves G, and these rollers are held apart by separator rolls R2, which bear against the surfaces W and are interposed between the flanges and a retainer R3 which has spaced openings through which the working rollers R1 pass into coaction with the outer race O.

No. 1,003,551—to Colcord Upton, Baltimore, Md., assignor to Simplex Roller Bearing Co., New York City. Granted, September 19, 1911; filed June 8, 1911.

COMBINED MUFFLER AND AIR HEATER—Air playing around the silencer is heated by the exhaust gases passing through same.

2. This patent relates to the device shown in Fig. 3, in which C denotes an outer muffler casing having an exhaust inlet I at one end and an exhaust outlet O at the other. Intercommunicating sections are arranged transversely of and closely fitting the interior of the casing, each section being formed by two oppositely disposed, centrally perforated members M and N having flanged edges and a baffle plate B located between them. Plate B is perforated at P and P1, beyond its center, and at its margin it is connected to the flanges of the two concave members mentioned. Thus the outer margins of the hollow sections have openings out of alignment with each other, which provide a tortuous gas passage. While the exhaust passes through the plurality of sections, air, which is permitted to enter at A, flows around these sections as indicated by the arrows, until it reaches the discharge opening D whence it streams through a pipe to the ventilator cap V arranged in the wall of the automobile body B.

No. 1,003,620—to Edward Dudley Lewis, Elmira, N. Y. Granted September 19, 1911; filed April 18, 1910.

ADJUSTABLE BRAKE—By means of a bolt tension on brake-band may be altered.

1. In Fig. 4 is shown the combination with a drum D and a fixed support S of a brake band B, B1 encircling the drum and carrying a stud S1 at one of its ends. In this stud a bolt B2 is adjustably mounted, which is connected to the link L, one end of which is pivotally mounted on the support S and the other connected to the free end of the bolt. An operating lever O has one end pivotally connected to the brake band at P, while the other end E, when in use, is connected to an operating rod, the intermediate portion of the operating lever being connected to ends of link L and bolt B2.

No. 1,003,621—to Charles L. Lincoln, assignor of one-half to Samuel H. Wheeler, Bridgeport, Conn. Granted September 19, 1911; filed December 28, 1910.

ODOMETER—Distance meter of the kind connected directly to the wheel hub.

1. This device comprises an annular housing adapted to embrace the wheel hub, a registering device within the same and an actuating device for the register consisting of a circularly curved lever having a fulcrum within the annular housing and on one side of the center of same, a weight being attached on the opposite side of the annular housing with respect to the center of the wheel hub, and means for connecting the circularly curved lever to the register.

No. 1,003,623—to Kendree Littleton, Pacolet, S. C. Granted September 19, 1911; filed May 23, 1911.

PNEUMATIC VEHICLE CUSHION—Shock absorber taking thrust by inflated tubes.

3. The invention protected by this patent is seen in Fig. 2. Above the spring S the axle A is mounted, which carries the cushioning device consisting a frustrum-shaped member F mounted directly on the axle and extending above it as shown; F has an horizontally extended base B, between which and an upper inverted-dish shaped member U pneumatic tubes P and P1 are interposed. Rods R are fastened to the spring and pass through the frustrum-shaped member, and they are bolted to the member U at B and B1, permitting U to vibrate vertically with the spring.

No. 1,003,579—to George J. Bancroft, Denver, Colo. Granted September 19, 1911; filed June 7, 1910.

ENGINE SILENCER—A muffler construction in which the gases pass through a spiral passageway.

1. This muffler consists of a casing containing semi-circular sections arranged to form a continuous spiral passage through the casing, the sections adjacent the inlet having central apertures while the other sections have closed conical centers with their apices toward the muffler inlet.

No. 1,003,531—to Lonnie C. Smoot and Wm. R. Masterson, Hillsboro, Tex. Granted September 19, 1911; filed Sept. 6, 1910.

TIRE PROTECTOR—A system of cables and rings is employed to keep the pneumatic tire in place on the wheel rim.

This patent relates to a tire protecting device, which consists of two rings encircling the wheel rim adjacent to its two sides. Around the rings and over the tire tread is led an endless cable, and to prevent slippage of the cable clamping rings co-operating with the first-mentioned rings are used, which are secured in their places.

No. 1,003,815—to Charles Scott, Baker, Ore. Granted September 19, 1911; filed May 10, 1911.

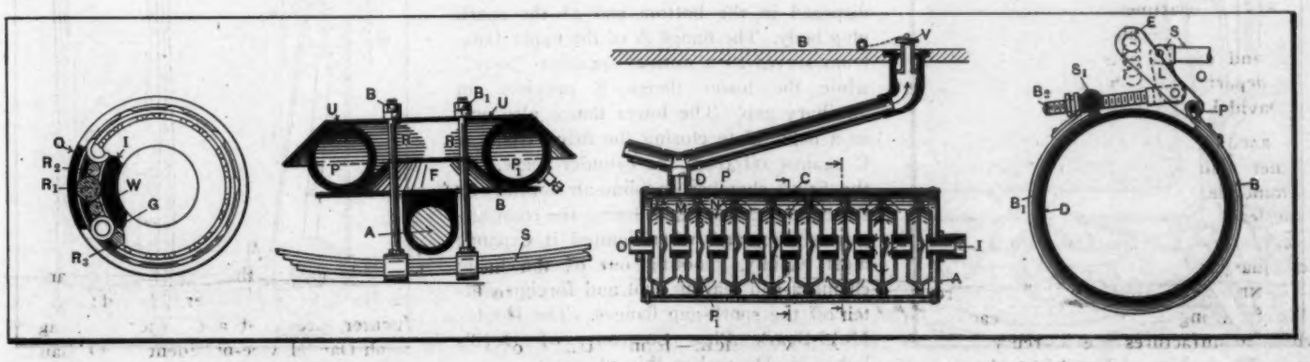


Fig. 1—Upton Bearing. Fig. 2—Bancroft Shock Cushion. Fig. 3—Lewis Heater. Fig. 4—Lincoln Brake

Newest Ideas Among the Accessories

Star Safety Starter

THE Star Starter, which is shown in Fig. 1, serves to start a motor car from the driver's seat by means of a lever, and it contains in its construction

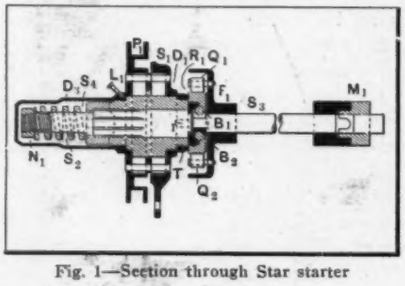


Fig. 1—Section through Star starter

a safety feature protecting the operator from the effects of backfiring. The front view of a car equipped with the Star starter is seen in Fig. 2, where P1 represents a pulley around which is wound the starting chain C1, which is led around pulley P2 to the operating cable actuated by the lever beside the driver. C2 is the castellated front end of the starter housing, and around it is fitted the dog D3 holding it to the frame by means of two bolts. In Fig. 1 the mechanical details of the starter are depicted, P1 denoting again the main pulley, which is fastened by pins to the frame S1 of the starter. These members are arranged around the starter shaft S4, carrying also a ratchet R1 and dog D1. Shaft S3 runs on a ball bearing B1, B2. To the dog F1 two pawls Q1 and Q2 are connected by means of bolts, these pawls engaging the ratchet and insuring its rotation in one direction only.

Referring to the front end of the starter, it consists of the spring S2 which is wound around S4 and serves to counteract the initial compression of the motor, while nuts N1 are used to adjust the tension of the spring. The whole of this part of the

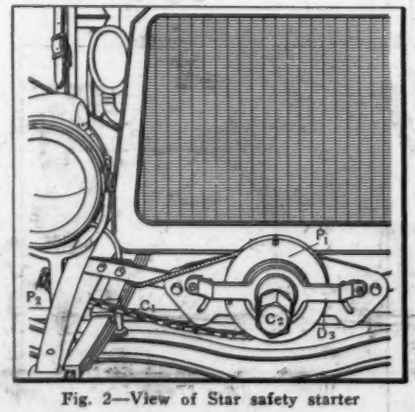


Fig. 2—View of Star safety starter

starter is covered by the dust-cover D2, fastened to pulley P1 by lock stud L1.

In starting, the chain being pulled toward the driver turns over pulley P1, which it engages, and also starter frame S1 pinned thereto. The engagement of pawls and ratchet causes shaft S3 to be turned over, and a minimum amount of work is expended in starting as the compression of the motor is balanced by the spring S2 and as the ratchet is carried on a ball bearing. Shaft S3 twists the crankshaft M1 of the motor around, thus starting the engine. Should the motor back-kick, the pawls will keep the ratchet from reversing its motion. Likewise, after the motor has

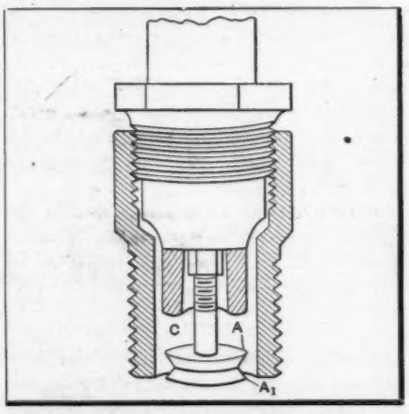


Fig. 3—Section of Maher Duplex plug

been started, the pawls are thrown out of engagement with the ratchet (and starter) by centrifugal force. The Star Starter Company of Rochester, N. Y.

Duplex Spark Plug

The Maher Duplex Multi-Spark Plug, claimed by its makers to be self-cleaning, has a double annular spark gap (Fig. 3), formed by two cone frustrums fixed at their smallest portions and centrally disposed in the bottom end of the spark plug body. The flange A of the upper frustrum serves as a normal sparking "point," while the lower flange B provides an auxiliary gap. The lower flange also acts as a baffle plate closing the firing chamber C against oil from the cylinder space. In the firing chamber gasoline-air mixture is stored and compressed during the compression stroke, and when ignited it expands most rapidly, shooting out of the firing chamber and tearing soot and foreign matter off the spark-gap flanges. The Duplex Multi-Spark Plug Company, of Devil's Lake, N. D., makes this plug.

Perfect Window Regulator

The device shown in Fig. 5 is the product of the Perfect Window Regulator Company, of 43 Exchange Place, New York City, and is intended to do away

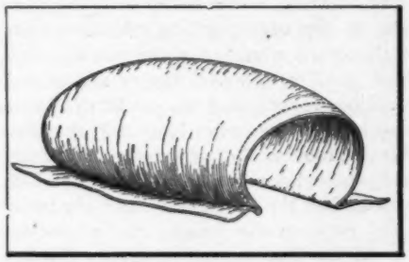


Fig. 4—Security blowout tire patch

with the troublesome strap generally used for opening the window of a closed car. Fig. 5 shows the window which is fastened to cam plate C1, which is held by the spindle S to the chain C2. This chain is led over the two sprockets V and W, and the latter may be rotated by means of the handle H, thereby lifting or lowering the window. The handle contains a clutch member holding it locked in any position, but permitting it to be released by turning.

Security Blowout Patch

The Security blowout patch (Fig. 4) is intended to be used between the inner tube and the tire casing to prevent blowouts or to serve as a repair in case of blowouts. It is composed of a series of tire-fabric layers, moulded on an aluminum form, giving it the exact dimension of the inside of the casing. The outside of the patch is coated with a quick vulcanizing compound. It is made by the Security Reliner Company, Montgomery, N. Y.

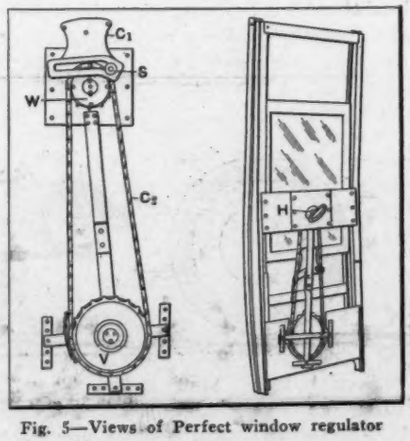


Fig. 5—Views of Perfect window regulator